Uni-Directional Cable Product Supporting M-Card: Multiple Profiles

Conformance Checklist: PICS

M-UDCP-PICS-I04-080225

March 2011 Errata:
Eliminate circular reference

ISSUED

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Document Status Sheet

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Key to Document Status Codes

Work in Process	An incomplete document, designed to guide discussion and generate feedback that may include several alternative requirements for consideration.
Draft	A document in specification format considered largely complete, but lacking review by Members and vendors. Drafts are susceptible to substantial change during the review process.
Issued	A stable document, which has undergone rigorous member and vendor review and is suitable for product design and development, cross-vendor interoperability, and for certification testing.
Closed	A static document, reviewed, tested, validated, and closed to further engineering change requests to the specification through CableLabs.

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11/01/2006	11/01/06 - Issue M-Host-UNI-DIR-PICS-I01-061101
1/05/2007	1/5/07 - Incorporated the folloing ECN to update to M-Host-UNI-DIR-PICS-I02-070105 Updated OpenCable Spec references CCCP2.0-N-06-0939-3 - ECM-PID for DESKey and CCI Protocol CCCP2.0-N-06-0969-1 - Padding ECM-PID Clarification
May 10, 2007	05/10/07 - Issue M-Host-UNI-DIR-PICS-I03-070510 Editorial Spec Reference Updates
February 25, 2008	02/25/08 - Issue M-Host-UNI-DIR-PICS-I04-080224 add requirement : ***R-380*** -non-removable label in close proximity to the Card slot

Table of Contents

1 Introduction

1.1 Scope and Applicability

The supplier of a Multi-Stream Uni-Directional Receiving Device (hereafter referred to as M-UDCP, or Multi-Stream Unidirectional Cable Product) supporting the M-Card in M-Mode implementation, that is claimed to conform to the M-UDCP specifications, shall complete the following Conformance Checklist (PICS: Proforma Implementation Conformance Statement) for the implementation in question. The PICS is a statement of which capabilities and options of the protocol have been implemented. The PICS can have a number of uses including these:

- The protocol implementers may use the PICS as a checklist to reduce the risk of failure to conform to the specifications through oversight.
- A protocol tester may use the PICS as the basis for selecting appropriate tests against which to assess the claim for conformance of the implementation.
- The supplier and acquirer of the implementation may use the PICS as a common basis for understanding the compliance of the implementation.
- The user of the implementation may use the PICS as a basis for initially assessing the possibility of interoperability with another implementation. (Note that while interoperability can never be guaranteed, failure to interoperate sometimes can be predicted from a incompatible PICS.)

There are some PICS items that cannot be tested as part of the unit tests and can only be tested in an interoperability environment.

1.2 Instructions for Completing the PICS

1.2.1 General Structure of the PICS

The first part of the PICS ***Identification*** , should include all the information necessary to fully identify both the supplier and the implementation.

The PICS is essentially a fixed-format questionnaire divided into several major sections each containing groups of individual items. Answers to the questionnaire items are to be provided in the middle column either by simply marking an answer – usually to indicate a restricted choice such as ***Yes*** , ***No*** , or ***N/A*** .

Each requirement item is identified by an item reference designator in the first column (*Item*). The second column (*Feature*) describes the requirement. The third column (*Spec*) indicates which specification document contains this requirement. The fourth column (*Ref*) states the reference to the section number(s) of the specification document where the requirement is expressed. The sixth thru eleventh column (*Stat*) indicates the status of the item for a particular profile– whether support is mandatory, optional, Informative, Not Applicable or Not Permitted indicated by **M, O, I, NA or NP** respectively. (Refer to section 1.2.4.) The middle column (*Support*) is the place for the answers.

A supplier may also provide, or might be required to provide, further information categorized as either *Additional Information* or *Exception Information*. (Refer to sections 1.2.2 and 1.2.3, respectively.) When present, this kind of information is to be provided in an attachment to the PICS. References to such information may be entered in the PICS in the *Support* column next to any answers. These references in the *Support* column are made using a label, ***Ai*** or ***Xi***, respectively, where ***i*** is any unambiguous identification for the item (*e.g.,* simply a numeral).

A completed PICS for the implementation in question includes the attached Additional Information and Exception Information.

NOTE: Where an implementation is capable of being configured in more than one way, a single PICS may be able to describe all such configurations. However, the supplier has the choice of providing more than one PICS, each covering some subset of the implementation configuration capabilities, in case that makes for easier and clearer presentation of the information.

UHMT	Unidirectional Host M-Card Terminal
UHMS	Unidirectional Host M-Card Set-top

Table 1 - M-UDCP devices supporting the M-Card

Unidirectional Host M-Card Terminal (UHMT)

One-way connectivity support via ANSI/SCTE 55-1,-2 OOB FDC

MPEG2 Main Profile @ Main Level (MP@ML) Standard Definition and Main Profile @ High Level (MP@HL) High-Definition decoding

Support for Multi Stream CableCARD operating in M-Mode only is mandatory for this profile.

Optional support for Single Stream CableCARD.

Unidirectional Host M-Card Set-top (UHMS)

One-way connectivity support via ANSI/SCTE 55-1,-2 OOB FDC

MPEG2 Main Profile @ Main Level (MP@ML) Standard Definition and Main Profile @ High Level (MP@HL) High-Definition

Support for Multi Stream CableCARD operating in M-Mode only is mandatory for this profile.

Optional support for Single Stream CableCARD.

1.2.2 Additional Information

Additional Information allows a supplier to provide further information intended to assist the interpretation of the PICS. ***At the present time, all suppliers are required to provide Additional Information that details the measurement techniques used to verify all mandatory items.*** Also, a supplier may provide an outline of the ways in which a single implementation can be set up to operate in a variety of environments and configurations.

1.2.3 Exception Information

A supplier might choose to answer an item with mandatory status in a way that conflicts with the indicated requirement. No pre-printed answer will be found in the Support column for this; instead, the supplier shall write some notation in the Support column that includes an ***Xi*** reference to Exception Information that is attached to the PICS.

An implementation for which Exception Information is required in this way does not conform, by definition, to the applicable OpenCable Interface Specification.

NOTE: A possible reason for the situation described above is that a defect in this standard has been reported, a correction for which is expected to change the requirement not met by the implementation.

1.2.4 Optional and Conditional Items

The PICS may contain ***optional*** items. These are indicated by an O in the status column. An optional item is an item that ***is not required*** to be implemented by an applicable specification.

Optional items, if implemented, may result in ***conditional*** items which would otherwise not be applicable. Conditional items also can have mandatory or optional status indicated by **C-M** in the status column. When answering a conditional item in the PICS, the supplier should indicate in the support column that the item is not applicable (**N/A**) if it is conditional upon an optional item that is not implemented. Otherwise, the supplier must answer ***Yes*** or ***No*** as required.

Not Applicable (NA) items imply that the requirement does not apply to a particular profile. It is used when the requirement applies to one profile, such as a set top box, but does not apply to another profile, such as a terminal. When N/A is indicated, it means that CableLabs will not test for this requirement and it is up to the manufacturer how to deal with the issue.

Not Permitted (NP) items imply that the requirement is specifically not allowed for a particular profile. For example requirements regarding the reverse data channel not only do not apply to a unidirectional device, they are prohibited from being implemented for that profile. CableLabs reserves the right to test and or verify that a not permitted PICS item is not implemented for any specific M-UDCP profile.

Where a group of items is subject to the same condition for a separate preliminary question about the condition appears at the head of the group with an instruction to skip to a later point in the questionnaire if the ***N/A*** answer is marked.

Individual conditional items are distinguished by a conditional symbol of the form ***<Item Name>*** at the beginning of the requirement description in the *Feature* column, where *Item Name* is the item reference designator that appears in the *Item* column of the item that raised this conditional requirement.

2 Identification

2.1 Implementation Identification

Supplier	
Contact point for queries about this PICS document	Steve Young Cable Television Laboratories 858 Coal Creek Circle Louisville Co, 80027 s.young@cablelabs.com 303-661-9100
Implementation Name(s) and Version(s)	
Other information necessary for full identification – e.g. names and versions of machine(s) and operating system(s)	

2.2 Protocol Summary

			Comments
Identification of Protocol Specification(s) – HOST – CableCARD Interface	**HPIA**	OC-SP-CC-IF2.0- OpenCable™ CableCARD™ Interface 2.0 Specification	
	HPIB	CEA-679-C (Part B) National Renewable Security Standard March 2005	
	HPID	ANSI/SCTE 55-2 2002 (formerly DVS 167): March 10, 2002, Digital Broadband Delivery System: Out-of-Band Transport – Mode B Part 2: Mode B, Society of Cable Telecommunications Engineers	

	HPIE	ANSI/SCTE 55-1 2002 (formerly DVS 178): February 25, 2002, Digital Broadband Delivery System: Out-of-Band Transport Part 1: Mode A	
	HPIL	ANSI/SCTE 54 2004 (formerly DVS 241): Digital Video Service Multiplex and Transport System Standard for Cable Television	
	HPIN	OC-SP-CCCP2.0-OpenCable™ CableCARD™ Copy Protection 2.0 Specification	
	HPIQ	PC Card Standard, Volume 2 Release 8.0, April 2001 Electrical Specification, Personal Computer Memory Card International Association, Sunnyvale, CA.	
	HPIR	DFAST Technology License Agreement: DFAST 11-10-04_v3	
Identification of Protocol Specification(s) – Network Interface	**NIA**	ANSI/SCTE 40 2004 Digital Cable Network Interface Standard	
	NIF	ISO/IEC 13818-1 MPEG-2 System	
	NII	ANSI/SCTE 07 2009~~6~~: Digital Video Transmission Standard for Cable Television	
	NIN	ANSI/SCTE 20 2001 (formerly DVS 157): Standard Methods for Carriage of Closed Captions and non-Real Time Sampled Video	
	NIV	ANSI/SCTE 21 2001 (formerly DVS 053): Standard for Carriage of NTSC VBI Data in Cable Digital Transport Streams	
	NIQ	SCTE 18 2002 (ANSI-J-STD-042-2002): Emergency Alert Message for Cable	
	NIR	ANSI/SCTE 65 2002 (formerly DVS 234): Service Information Delivered Out-of-Band for Digital Cable Television	
	NIT	ATSC A/52B Digital Audio Compression AC3 standard	
	NIU	SCTE 43 2004 (formerly DVS 258) DIGITAL VIDEO SYSTEMS CHARACTERISTICSSTANDARD FOR CABLE TELEVISION	
Identification of Protocol Specification(s) – HOST	**HB**	~~EIA/CEA-818-D Cable Compatibility Requirements~~	Eliminated circular reference; see NII

	HD	ATSC A/53E ATSC Digital Television Standard	
	HD2	CEA-861-B, A DTV Profile for Uncompressed High Speed Digital Interfaces	
	HE	ATSC A/65C Program and System Information Protocol for Terrestrial Broadcast and Cable	
	HF	CEA-542-B Cable Television Channel Identification Plan	
	HG	CEA-608-C Recommended Practice for Line 21 Data Service	
	HJ	FCC 47 CFR Chapter 1 (10-1-98 Edition) Part 15 – Radio Frequency Devices, Class B	
	HI	EIA-708B Digital Television (DTV) Closed Captioning	
	HK	CEA-770.3-C, High Definition TV Analog Component Video Interface	
	HL	High-bandwidth Digital Content Protection System, Revision 1.1, 9 June 2003	
	HM	High-Definition Multimedia Interface, Specification Version 1.1, May 20, 2004	
Identification of amendments or updates to the specification which have been completed as part of this PICS			
Have any Exception items been required (The answer “Yes” means that the implementation does NOT conform to the identified specifications)		**Yes No**	
Date of This Statement			

2.3 ECN Summary

2.3.1 ECNs NOT Incorporated but Mandatory

*****This Section is IMPORTANT – READ IT ******

This section contains a list of recently approved ECNs. All Certification Wave participants should review these documents. They are available in the participant section of the CableLabs© web site. All listed items will be incorporated into the PICS documents as a reference at a later date.

ECN	Subject

2.3.2 Future PICS conformance Items

*****This Section is IMPORTANT – PLEASE READ IT ******

Any section or individual PICS items contained in the PICS that are GRAYED are going to be required in a future certification wave. Below is a list of the Grayed out PICS and the Certification Wave they will become required.

To Be Determined at a Later Date (TBD)

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name

3 M-UDCP Host Device Capabilities / Critical PICS

Critical Test PICS item is a PICS item that is essential to ensure the device under test (A) can tune and display (TV products) scrambled digital services via the Card conditional access system, (B) will not technically disrupt, impede or impair delivery of services to cable subscribers, (C) will not cause physical harm to the cable network or the Card, (D) will not facilitate theft of service or otherwise interfere with reasonable actions taken by Cable Operators to prevent theft of service, (E) will not jeopardize the security of any services offered over the cable system, (F) will not interfere with or disable the ability of a Cable Operator to communicate with or disable a Card or to disable services being transmitted through a Card, or (G) will not impede or impair control of content protection. All other tests are called Non-critical Tests.

3.1 Card Interface

3.1.1 Power Management

	Common Power							
Hpower.9	The M-UDCP SHALL fully power the Card and OOB receive circuitry (OOB tuner, demodulator, CRX and DRX pins) at all times AC power is available to the M-UDCP and the Card is inserted, after the Card has been initialized.	HPIA	7.4.1.1 7.4.1.2			M	M	Host Standby Mode
Hpower.13	The M-UDCP SHALL be capable of providing up to 1 Amp total on the VCC pins (500 mA each) per Card supported.	HPIA	7.4.1.1 7.4.1.2			M	M	Host Power Supply
Hpower.22	On the M-UDCP VPP2 MUST not exceed VCC=0.3V until VCC has reached VCC min as defined in Table 7.4-1. Card Power Supply DC Characteristics, of HPIA.	HPIA	7.4.2.2.1			M	M	Host Initialization
Hpower.23	The M-UDCP SHALL use the DC signaling characteristics for the “LogicPC” signaling levels for the designated pin(s) as defined in Table 7.4-4 of HPIA.	HPIA	7.4.1.3.2			M	M	Host Initialization
Hpower.24	The M-UDCP SHALL use the DC signaling characteristics for the “LogicCB” and "CCLK" signaling levels for the designated pin(s) as defined in Table 7.4-5 of HPIA.	HPIA	7.4.1.3.2			M	M	Host Initialization
Hpower.25	The M-UDCP SHALL use the VPP Pin Configurations, and Associated Card Operating Mode interface signal types for the designated pin(s) as defined in Table 7.4-2 of HPIA.	HPIA	7.4.1.3.2 Table 7.4-2			M	M	Host Initialization
Hpower.26	The M-UDCP SHALL comply with the associated pull-up and pull-down resistor values for the designated pin(s) and associated Card operating modes as defined in Table 7.4-6.	HPIA	7.4.1.3.2			M	M	Host Initialization

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
Hpower.27	M-UDCP SHALL: 1. Set the state of VPP1= Logic Low (grounded or pulled-down) and VPP2= open circuit. 2. Pull-up CD1#, CD2#, VS1#, VS2# and MDET to 3.3VDC using a pull-up resistor as defined in table 4-19 of [PCMCIA2]. 3. Detect the presence of a Card using CD1# and CD2# as defined in section 4.10 of [PCMCIA2]. 4. High Z VCC pins until after the CableCARD device type is determined. 5. Determine if VS2# is tied to MDET. Note: The M-UDCP MAY test this by toggling VS2# and watching to see that MDET tracks VS2#. If VS2# is tied to MDET, the M-UDCP SHALL proceed with the power up in M-Mode; 6. Apply power to the VCC pins (3.3V) and VPP2 (5.0V) once the Host determines that the Card is an M-CARD. VPP2 is provided to support an M-Card that contains an optional smart card.	HPIA	7.3.4.2			M	M	Host Initialization
Hpower.29	If S-Mode is not supported, and if VS2# is not tied to MDET then the M-UDCP SHALL NOT power the PC Card and SHALL display an error message indicating the Card inserted is not supported as defined in Annex B [HPIA].	HPIA	7.3.4.2			C-M	C-M	Initialization Error Detection and Handling
M-Mode Power								
Hpower.9	The M-UDCP SHALL fully power the Card and OOB receive circuitry (OOB tuner, demodulator, CRX and DRX pins) at all times AC power is available to the M-UDCP and the Card is inserted, after the Card has been initialized.	HPIA	7.4.1.1 7.4.1.2			M	M	Host Power Supply
Hpower.11	The M-UDCP SHALL provide 3.3 V on VCC and 5V on VPP2 with the DC Characteristics as defined in Table 7.4-1 of HPIA	HPIA	7.4.1.2			M	M	Host Power Supply
Hpower.12	The M-UDCP SHALL apply 3.3 V on VCC and 5V on VPP2 as defined in section 7.3.4.2 of HPIA	HPIA	7.4.1.2			M	M	Host Power Supply
Hpower.13	The M-UDCP SHALL be capable of providing up to 1 Amp total on the VCC pins (500 mA each) per Card supported.	HPIA	7.4.1.2			M	M	Host Power Supply
Hpower.14	The M-UDCP SHALL be capable of providing up to 125 mA on the VPP2 pin.	HPIA	7.4.1.2			M	M	Host Power Supply
Hpower.15	The M-UDCP SHALL provide M-Mode Power Supply DC Characteristics as defined section 7.4.1.2 of HPIA and Table 7.4-1 .	HPIA	7.4.1.2			M	M	Host Power Supply
Hpower.21	The M-UDCP SHALL detect the state of CD1# and CD2#, and upon card removal power-down the VCC and VPP pins.	HPIA	7.4.1.2			M	M	Host Initialization
Hpower.19	The MOCLK signal SHALL be derived from MICLK and SHOULD operate at 27 MHz.	HPIA	7.3.3.4			M	M	Vendor Documentation Indicating Compliance
Hpower.20	The MOSTRT and MDO[7:0] signals SHALL be clocked into the M-UDCP on the rising edge of MOCLK .	HPIA	7.3.3.4			M	M	Vendor Documentation Indicating Compliance

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
Hpower.28	Upon removal of the Card, when operating in M-Mode, the M-UDCP SHALL detect the state of the CD1# and CD2# pins and power-down the VCC and VPP interface pins, and upon Card insertion, determine the Card type prior to applying VCC and VPP power.	HPIA	7.4.1.2			M	M	Host Initialization
Host Physical Interface								
HPPh.1	The M-UDCP SHALL accept both Type I and Type II PC Cards.	HPIQ Volume 3	4.1			M	M	Host CableCARD Interface Visual
HPPh.3	The M-UDCP SHALL have PC Card connector described in Section 4 of PC Card Standard, Volume 3 - Physical Specification.	HPIQ Volume 3	4.2, 11			M	M	Host CableCARD Interface Visual
HPPh.4	The M-UDCP SHALL have PC Card guidance described in Section 5 of PC Card Standard, Volume 3 - Physical Specification.	HPIQ Volume 3	5			M	M	Host CableCARD Interface Visual
HPPh.6	The M-UDCP SHALL have connector reliability described in Section 7 of PC Card Standard, Volume 3 - Physical Specification.	HPIQ Volume 3	7			M	M	Host CableCARD Interface Visual, Vendor Documentation Indicating Compliance
HPPh.7	The M-UDCP SHALL have connector durability described in Section 8.2 (harsh environment) of PC Card Standard, Volume 3 - Physical Specification.	HPIQ Volume 3	8.2			M	M	Host CableCARD Interface Visual, Vendor Documentation Indicating Compliance

3.1.2.2 M-UDCP Card PCMCIA Operation

PCMCIA Interface Initialization								
HPPii.2	The M-UDCP SHALL not route the MPEG data stream through the Card during PCMCIA reset.	HPIA	7.6.3.3.2			M	M	Vendor Documentation Indicating Compliance
HPPii.9	The OOB receiver in the M-UDCP SHALL be connected only to the Card module interface.	HPIA	7.6.3.8			M	M	Vendor Documentation Indicating Compliance
HPPii.10	The Card SHALL behave as a memory-only device, and the M-UDCP SHALL implement a memory-only device interface with the following restrictions: Signals D8~D15 SHALL remain in the high-impedance state. 16-bit read and write modes are not available. CE2# SHALL be ignored and interpreted by the Card as always being in the 'High' state. The M-UDCP SHALL NOT drive Address lines A15~A25.	HPIA	7.4			M	M	Host Initialization
HPPii.11	The M-UDCP SHALL support the pin assignment described in the table of section 7.1 of reference HPIA.	HPIA	7.1			M	M	Host Initialization

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name

3.1.2.3 Initialization Procedure

Initialization								
HPinit.301	The M-UDCP SHALL perform power and reset timing functions as defined in section 7.4.2.2.1 of HPIA and Table 7.4-8.	HPIA	7.4.2.2.1			M	M	Host Initialization
HPinit.302	The M-UDCP SHALL provide Power Supply DC Characteristics as defined section 7.4.1.2 of HPIA and Table 7.4-1.	HPIA	7.4.1.2			M	M	Host Initialization
HPinit.303	The M-UDCP SHALL provide Card signal types as defined in section 7.4.1.3.2 of HPIA and Table 7.4-2.	HPIA	7.4.1.3.2			M	M	Host Initialization
HPinit.304	The M-UDCP SHALL provide DC signal requirements as defined in section 7.4.1.3.2 of HPIA and Table 7.4-3.	HPIA	7.4.1.3.2			M	M	Host Initialization
HPinit.305	The M-UDCP SHALL provide DC Signaling Characteristics for the "LogicPC" Signaling Level as defined section 7.4.1.3.2 of HPIA and Table 7.4-4	HPIA	7.4.1.3.2			M	M	Host Initialization
HPinit.306	The M-UDCP SHALL provide DC Signaling Characteristics for the "LogicCB" Signaling Level as defined section 7.4.1.3.2 of HPIA and Table 7.4-5	HPIA	7.4.1.3.2			M	M	Host Initialization
HPinit.307	The M-UDCP SHALL provide DC Signaling Characteristics for the Host Pull-ups and Pull-downs as defined section 7.4.1.3.2 of HPIA and Table 7.4-6	HPIA	7.4.1.3.2			M	M	Host Initialization
HPinit.308	The M-UDCP SHALL use its output buffer to transmit Command Channel and Extended Channel data communications to the Card as defined in section 7.6.4 of HPIA.	HPIA	7.6.4			M	M	SCTE 65 Service Information Delivered OOB
HPinit.309	The M-UDCP SHALL use its input buffer to receive Command Channel and Extended Channel data communicated from the Card as defined is 7.6.4 of HPIA.	HPIA	7.6.4			M	M	SCTE 65 Service Information Delivered OOB
Card Resource Profile								
HPinit.236	The M-UDCP Resource Manager sends a Profile Inquiry to Card with Profile_inq_tag value of 0x9F8010.	HPIA	7.6.3.11.8, 7.6.3.11.9, 7.6.4			M	M	Host Data Channel Multi-Layer
Host Resource Profile								
HPinit.237	The M-UDCP sends a profile_changed APDU with profile_changed _tag value of 0x9F8012.	HPIA	7.6.3.11.9, 7.6.4			M	M	Host Data Channel Multi-Layer
	The Card performs a profile_inq APDU.	HPIA	7.6.3.11.8, 7.6.4			|	|	
HPinit.238	The M-UDCP SHALL reply to a profile_inq() APDU with profile_reply() APDU using a tag value of 0x9F8011 and XXXXXXXX 32 bit resource_identifier.	HPIA	7.6.3.11.7, 7.6.4			M	M	Host Data Channel Multi-Layer
Application Info Session Initialization								
	The Card requests an application session be opened by sending an open_session_request with an open_session_request_tag of 0x91 and a resource identifier of 0x00020081.	HPIA	9.5.1			|	|	

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
HPinit.239	The M-UDCP SHALL respond to an open_session_request() APDU with a open_session_response() APDU with a tag value of 0x92, a resource_identifier value of 0x0020081 and a session_nb YYYY 16 bit unique identifier.	HPIA	9.5.1			M	M	Host Data Channel Multi-Layer
HPinit.240	The M-UDCP then sends an Application Info Inquiry() APDU to the Card with application_info_inq_tag value of 0x9F8020.	HPIA	9.5.1			M	M	Host Application and MMI
Initialization Error Detection and Handling								
Card does not respond to M-UDCP profile_inq within 5 secs.								
HPinit.262	When the Card does not respond to the M-UDCP profile_inq within five seconds, the M-UDCP SHALL either; Minimal – Perform 1 PCMCIA reset and Report Error using screen in figure B-1 "Error Display" if not successful Optional – Retry PCMCIA resets up to two times and then Report Error. Preferred – Perform at least 1 PCMCIA reset. Report Error if not successful, and continue to perform PCMCIA resets.	HPIA	Annex B			M	M	Initialization Error Detection and Handling
Card does not respond to M-UDCP ca_info_inq within 5 secs.								
HPinit.279	When the Card does not respond to the M-UDCP ca_info_inq within five seconds, the M-UDCP SHALL either; Minimal – Perform 1 PCMCIA reset and Report Error using screen in figure B-1 "Error Display" if not successful Optional – Retry PCMCIA resets up to two times and then Report Error. Preferred – Perform at least 1 PCMCIA reset, and Report Error if not successful and continue to perform PCMCIA resets.	HPIA	Annex B			M	M	Initialization Error Detection and Handling
Card fails to respond within 5 secs. (general case)								
HPinit.290	When the Card fails to respond to any request other than described above by HPinit.262 or HPinit.279 within five seconds, the M-UDCP SHALL either; Minimal – Perform 1 PCMCIA reset and Report Error using screen in figure B-1 "Error Display" if not successful. Optional – Retry PCMCIA resets up to two times and then Report Error. Preferred – Perform at least 1 PCMCIA reset. Report Error if not successful, and continue to perform PCMCIA resets.	HPIA	Annex B			M	M	Vendor Documentation Indicating Compliance
Invalid session APDU from Card								
HPinit.291	When the M-UDCP receives an invalid session APDU from the Card the M-UDCP SHALL ignore invalid sessions.	HPIA	Annex B			M	M	Vendor Documentation Indicating Compliance
Invalid SPDU tag from Card								
HPinit.292	When the M-UDCP receives an invalid SPDU tag from the Card the M-UDCP SHALL ignore invalid SPDU tags.	HPIA	Annex B			M	M	Vendor Documentation Indicating Compliance

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
Invalid APDU tag from Card								
HPinit.293	When the M-UDCP receives an invalid APDU tag from Card the M-UDCP SHALL ignore invalid APDU tags.	HPIA	Annex B			M	M	Vendor Documentation Indicating Compliance
Session ID from Card not created								
HPinit.295	When the M-UDCP receives a Session ID from the Card that has not been created by the M-UDCP the M-UDCP SHALL ignore session ID's that have not been created.	HPIA	Annex B			M	M	Vendor Documentation Indicating Compliance
Incompatible Card device inserted								
HPinit.312	When an Incompatible Card device is inserted, the M-UDCP in M-Mode SHALL display an error message using the screen in figure B-1 "Error Display" to the user, and either; Minimal – Perform 1 PCMCIA reset and Report Error if not successful. Optional – Retry PCMCIA resets up to two times and then Report Error. Preferred – Perform at least 1 PCMCIA reset. Report Error if not successful, and continue to perform PCMCIA resets.	HPIA	Annex B			M	M	Initialization Error Detection and Handling
ER Bit set in the IQB (M-Mode)								
HPinit.316	When the Host sets the ER bit but the Card fails to set the CR bit in the IQB within 5 seconds of RESET going inactive the M-UDCP SHALL display an error message using the screen in figure B-1 "Error Display" to the user, and either; Minimal – Perform 1 PCMCIA reset and Report Error if not successful. Optional – Retry PCMCIA resets up to two times and then Report Error. Preferred – Perform at least 1 PCMCIA reset. Report Error if not successful, and continue to perform PCMCIA resets.	HPIA	Annex B			M	M	Vendor Documentation Indicating Compliance

3.1.3 Data Channel Protocol

M-Mode Configuration								
DPh.64	On the M-UDCP SCLK (pin 28), the clock, SHALL operate at a nominal rate of 6.75 MHz (27 MHz / 4).	HPIA	7.4.2.2.5			M	M	Host Initialization
DPh.65	On the M-UDCP SCTL (pin 27), the serial control signal, SHALL change on the falling edge of the SCLK signal.	HPIA	7.4.2.2.5			M	M	Host Initialization
DPh.66	On the M-UDCP SDI (pin29), the serial Host data SHALL change on the falling edge of the SCLK signal.	HPIA	7.4.2.2.5			M	M	Host Initialization
DPh.67	A control signal (SCTL) SHALL be utilized to signal the start of a byte of data as well as the start of a new packet. For Host to Card data communications, the Host SHALL use pin 29 (SDI).	HPIA	7.6.2.1			M	M	Host Initialization
DPh.68	The M-UDCP SHALL input the data on the rising edge of the SCLK signal.	HPIA	7.4.2.2.5			M	M	Host Initialization

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
DPh.69	The M-UDCP SHALL use a control signal (SCTL) to signal the start of a byte of data as well as the start of a new packet.	HPIA	7.6.2.1			M	M	Host Initialization
DPh.70	The M-UDCP SHALL use two separate data signals: Host to Card data (SDI), and Card to Host (SDO).	HPIA	7.6.2.1			M	M	Host Initialization
DPh.71	On the M-UDCP the duty cycle of SCLK SHALL be no less than 40%, no more than 60%.	HPIA	7.4.2.2.5			M	M	Host Initialization
CPU Interface								
DPh.73	For the M-UDCP the query byte format SHALL follow the structure as defined in table 7.6-4 of HPIA.	HPIA	7.6.2.2			M	M	Host Initialization
DPh.74	In the CPU Interface Packet the M-UDCP SHALL set bit 6, the Host Ready (HR) flag, when it is ready to receive only or transmit and receive data as this flag allows the Host to control the throughput of packets from the Card. The ready flags (HR & CR) SHALL be used for flow control.	HPIA	7.6.2.3			M	M	Host Initialization
DPh.95	The HR flag SHALL be used for flow control from the Card.	HPIA	7.6.2.3			M	M	Host Initialization
DPh.75	The M-UDCP SHALL use the Extended Channel (EC) flag in the query byte to determine whether the data transmitted from the source is intended for the Command or Extended channels.	HPIA	7.6.2.3			M	M	Host Initialization
DPh.76	The M-UDCP SHALL set the EC flag in the query byte to 1 when the data transmitted is indented for the Extended Channel.	HPIA	7.6.2.3			M	M	Host Initialization
DPh.77	The M-UDCP SHALL set the EC flag in the query byte to 0 when the data transmitted is indented for the Command Channel.	HPIA	7.6.2.3			M	M	Host Initialization
DPh.78	For transactions that contain less than 4,096 data bytes the M-UDCP SHALL set the Last (L) flag in the query byte.	HPIA	7.6.2.3			M	M	Host Initialization
DPh.79	For transactions that contain less than 4,096 data bytes the M-UDCP SHALL set the First (F) flag in the query byte.	HPIA	7.6.2.3			M	M	Host Initialization
DPh.80	Once the M-UDCP detects that the Card has set the Data Available (DA) flag and the CR flag, and when the Host's HR flag is also set in the query byte, the M-UDCP SHALL read the following length bytes from the Card and SHALL clock all of the remaining data in prior to indicating a start of message.	HPIA	7.6.2.3			M	M	Host Initialization
DPh.96	When the M-UDCP sets it's DA and HR flag and detects that the Card has set it's CR flag, the M-UDCP in M-Mode SHALL send the length bytes to the Card and SHALL send all remaining data prior to indicating a start of a message.	HPIA	7.6.2.3			M	M	Host Initialization
DPh.81	If the M-UDCP detects that the Card has set the Error Detected (ER) flag in the query byte, it SHALL perform a Card reset.	HPIA	7.6.2.3, 7.6.2.4			M	M	Host Initialization

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
DPh.82	The M-UDCP is the master of the CPU interface. The Host SHALL always transmit the Interface Query Byte (IQB), even when it does not have data to transmit.	HPIA	7.6.2.4			M	M	Host Initialization
DPh.83	The M-UDCP SHALL transmit the IQB immediately following the last byte of the previous packet byte, even if the previous packet did not include any data.	HPIA	7.6.2.4			M	M	Host Initialization
DPh.84	The M-UDCP SHALL repeatedly send the IQB followed by 2 bytes of packet count until a message transfer begins.	HPIA	7.6.2.4			M	M	Host Initialization
DPh.85	If the M-UDCP does not have any data to send, the packet count following the IQB SHALL be set to 0.	HPIA	7.6.2.4			M	M	Host Initialization
DPh.86	Each packet SHALL only be either a command or extended type, i.e. no mixing of types.	HPIA	7.6.2.4			M	M	Host Initialization
DPh.87	If a packet is not segmented, then both the F and L bits SHALL be set.	HPIA	7.6.2.4			M	M	Host Initialization
DPh.88	Packets smaller than 4,096 bytes SHALL not be segmented.	HPIA	7.6.2.4			M	M	Copy Protection
DPh.89	If a packet is larger than 4,096 bytes, then it SHALL segmented into contiguous packets.	HPIA	7.6.2.4			M	M	Copy Protection
DPh.90	The F bit SHALL be set for the first packet. The L bit SHALL be set for the last packet.	HPIA	7.6.2.4			M	M	Copy Protection
DPh.91	The ready flags (HR & CR) SHALL be used for flow control.	HPIA	7.6.2.4			M	M	Copy Protection
DPh.94	The M-UDCP SHALL have separate read and write buffers that are 4,096 bytes, excluding the interface query byte and packet count.	HPIA	7.6.2.4			M	M	Copy Protection
	Session Layer							
DSs.1	The M-UDCP SHALL have a session layer that uses a Session Protocol Data Unit (SPDU) structure to exchange data at session level between the M-UDCP and the Card.	HPIA	9.1.4			M	M	Host Data Channel Multi-Layer
DSs.2	The M-UDCP SHALL implement a SPDU has the structure shown in the table 9.1-1 of HPIA.	HPIA	9.1.4			M	M	Host Data Channel Multi-Layer
DSs.3	The M-UDCP SHALL transport a SPDU in the data field of one or several TPDU.	HPIA	9.1.4			M	M	Host Data Channel Mult-Layer
	Only the session_number object has a data field containing one or several APDUs.	HPIA	9.1.4					
	open_session_request is issued by the Card to the M-UDCP in order to request the opening of a session between the Card and one resource provided either by the M-UDCP or by a Card. open_session_request has the structure shown in the table 9.1-2 of HPIA.	HPIA	9.1.4.1					
DSs.6	The resource_identifier SHALL match in both class and type a resource that the M-UDCP has in its list of available resources.	HPIA	9.1.4.1			M	M	Host Data Channel Multi-Layer

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
DSs.7	If the version number of the supplied resource identifier is zero, the M-UDCP SHALL use the highest version in its list it supports. If the requested version number reported by the Card is less than or equal to the version number declared by the M-UDCP then the version number requested by the Card SHALL be used by the M-UDCP. If the requested version number declared by the Card is higher than the version number declared by in the M-UDCP, then the Card SHALL use the requested version reported by the M-UDCP.	HPIA	9.1.4.1			M	M	Host Data Channel Multi-Layer
DSs.8	The M-UDCP SHALL respond to an open_session_ request SPDU with an open_session_response SPDU as defined in section 9.1.4.2 of HPIA.	HPIA	9.1.4.2			M	M	Host Data Channel Multi-Layer
DSs.9	The M-UDCP SHALL respond to a open_session_request SPDU with a open_session_response SPDU. Valid session_status values in open_session_request SPDU SHALL be 'session is opened' (00), 'session not opened, resource non-existent' (F0), 'session not opened, resource exists but unavailable' (F1), 'session not opened, resource exists but version lower than requested' (F2), 'session not opened, resource busy' (F3), ‘other’(reserved).	HPIA	9.1.4.2			M	M	Host Data Channel Multi-Layer
DSs.10	The M-UDCP SHALL return the actual resource_identifier of the resource requested, with the current version number.	HPIA	9.1.4.2			M	M	Host Data Channel Multi-Layer
DSs.12	When the response is resource_non_existent the M-UDCP SHALL respond with the resource_identifier field identical to that supplied in the open request.	HPIA	9.1.4.1			M	M	Vendor Documentation Indicating Compliance
DSs.11	The M-UDCP SHALL allocate a session number for the requested session (session_nb). Session_nb will be used for all subsequent exchanges of APDUs between the Card and the resource until the session is closed.	HPIA	9.1.4.2			M	M	Host Data Channel Multi-Layer
DSs.14	The M-UDCP SHALL issue a close_session_request object to close a session. close_session_request has the structure shown in the table 9.1-4 of HPIA.	HPIA	9.1.4.5			M	M	Host Data Channel Multi-Layer
DSs.15	When the M-UDCP has received a close_session_request it SHALL respond with a close_session_response to acknowledge the closing of the session. close_session_response has the structure shown in the table 9.1-5 of HPIA.	HPIA	9.1.4.6			M	M	Host Data Channel Multi-Layer

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
DSs.16	The session_status field in the close_session_response object SHALL be one of the following: 'session is closed as required' (00), 'session_nb in the request is not allocated' (F0). 'other' (reserved)	HPIA	9.1.4.6			M	M	Host Data Channel Multi-Layer
DSs.17	The session_number object SHALL always precede a body of the SPDU containing APDU. Session_number has the structure shown in the table 9.1-6 of HPIA.	HPIA	9.1.4.7			M	M	Host Data Channel Multi-Layer
DSs.18	The M-UDCP SHALL use the names of the objects and the tag values as outlined in table 9.3-2 of reference HPIA.	HPIA	9.3			M	M	Host Data Channel Multi-Layer
DSs.19	For the M-UDCP command channel, only one SPDU SHALL be allowed per packet.	HPIA	7.6.2.4			M	M	Host Data Channel Multi-Layer
	Application Layer-General							
DApGn.1	The M-UDCP SHALL support the Resource Manager resource. Note: Resource Manager specific PICS are located in section DApRm Application Layer – Resource Manager	HPIA	9.4			M	M	Host Data Channel Multi-Layer
DApGn.2	The M-UDCP SHALL support the MMI resource. Note: This is covered in more detail in section DApMi – Application Layer - MMI	HPIA	9.11			M	M	Host Data Channel Multi-Layer
DApGn.3	The M-UDCP SHALL provide support for Application Info resource. Note: Application Info resource PICs are located in section DApAi – Application Layer – Application Information	HPIW	8.4.1			M	M	Host Data Channel Multi-Layer
DApGn.5	The M-UDCP SHALL provide support for the Conditional Access Support resource. Note: Conditional Access Support resource PICs are located in section DApCa – Application Layer – Conditional Access Support	HPIA	9.6.3.11.11			M	M	Host Data Channel Multi-Layer
DApGn.7	The M-UDCP SHALL provide support for the Copy Protection resource. Note: Copy Protection resource PICs are located in section CpsL – Application Layer – Copy Protection	HPIA	8 9.3 Table 9.3-2			M	M	Host Data Channel Multi-Layer
DApGn.8	The M-UDCP SHALL provide support for the Host Control resource. Note: Host Control resource PICs are located in section DApHc – Application Layer – Host Control.	HPIA	9.8			M	M	Host Data Channel Multi-Layer

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
DApGn.9	The M-UDCP SHALL provide support for version 1 of the Extended Channel Support resource. Note: Extended Channel Support resource PICs are located in section ExchF – Application Layer – Extended Channel Support.	HPIA	9.14			M	M	Host Data Channel Multi-Layer
DApGn.23	The M-UDCP SHALL provide support for the Card Homing Resource. Note: Card Module Homing resource PICs are located in section DApHm – Application Layer – DapHm.	HPIA	9.18.4			M	M	Host Data Channel Multi-Layer
DApGn.14	The M-UDCP SHALL provide support for the System Time resource. Note: System Time resource PICs are located in section DApSt – Application Layer – System Time	HPIA	9.3.1 9.10			M	M	Host Data Channel Multi-Layer
DApGn.24	The M-UDCP SHALL provide support for the CARD RES resource. Note: CARD RES resource PICs are located in section DApHdis – Application Layer – Device Capability Discovery	HPIA	9.12			M	M	Host Data Channel Multi-Layer
DApGn.15	The M-UDCP SHALL support the resources identified in section 9.3 of HPIA depending on profile of the Host.	HPIA	9.3			M	M	Host Data Channel Multi-Layer
DApGn.16	For all protocols in the application layer the M-UDCP SHALL use the common Application Protocol Data Unit (APDU) structure to send application data between the Card and the M-UDCP. APDU has the structure shown in the table 9.3-1 of HPIA.	HPIA	9.3			M	M	Host Data Channel Multi-Layer
DApGn.18	Only a single APDU SHALL be supported in the body of an SPDU.	HPIA	9.3			M	M	Host Data Channel Multi-Layer
Application Layer - Resource Manager								
DApRm.1	The M-UDCP SHALL support at least 32 sessions of the resource manager.	HPIA	9.3.1 Table 9.3-4			M	M	Host Data Channel Multi-Layer
DApRm.2	The M-UDCP SHALL support Resource Manager resource ID 0x00010041 (class 1, type 1, version 1)	HPIA	9.3 Table 9.3-2			M	M	Host Data Channel Multi-Layer
DApRm.3	When the M-UDCP powers-up or the Card is plugged-in, the M-UDCP SHALL create exactly one transport connection to the CardCARD.	HPIA	9.3.1 Table 9.3-4			M	M	Host Data Channel Multi-Layer
DApRm.4	After opening the session for the resource manager the resource manager (the M-UDCP) SHALL send a profile_inq() to the application or resource provider. The profile_inq() APDU has the structure shown in the table 9.4-3.	HPIA	9.4.1			M	M	Host Data Channel Multi-Layer

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
	The application or resource provider responds with profile_reply( )APDU listing the resources it supports in the profile_reply() APDU. The profile_reply() APDU has the structure shown in the table 9.4-4.	HPIA	9.4.2					
	The application or resource will wait for profile_changed() APDU. While waiting it can neither create sessions to other resources nor can it accept sessions from other applications.	HPIA	9.4.3					
DApRm.8	Once the M-UDCP has built its resource list it SHALL send a profile_changed() APDU object on all current resource manager sessions. The profile_changed() APDU has the structure shown in the table 9.5-4.	HPIA	9.4.3			M	M	Host Data Channel Multi-Layer
	When it receives the profile_changed() APDU for the first time the application or resource provider can interrogate the M-UDCP with profile_inq() APDU.	HPIA	9.4.1 9.4.3					
DApRm.10	When asked by the Card the M-UDCP SHALL send a profile_reply() APDU with the M-UDCP's list of available resources. The profile_reply() APDU has the structure shown in the table 9.4-4.	HPIA	9.4.2			M	M	Host Data Channel Multi-Layer
	After this first operation of the Profile Change protocol the application or resource provider is now free to create or accept other sessions.	HPIA	9.4					
Application Layer - Application Information								
DApAi.1	Application Information resource (ID 0x00020081, class 2, type 2, version 1) SHALL be provided by the M-UDCP.	HPIA	9.5 Table 9.5-1			M	M	Host Application Information and MMI
	The Card will open one session to Application Information resource as soon as they have completed their Profile Inquiry phase of initialization.	HPIA	9.5					
DApAi.13	The M-UDCP SHALL not close the Application Information resource session during normal operation.	HPIA	9.5			M	M	Host Application Information and MMI
DApAi.5	Once the Application Information resource session is opened, M-UDCP SHALL send the application_info_req() APDU to the Card to advertise its display capabilities. application_info_req() has the structure shown in section 9.5.1 of HPIA.	HPIA	9.5.1			M	M	Host Application Information and MMI
	The Card responds with an application_info_cnf() APDU to describe its supported applications.	HPIA	9.5.2					
DApAi.30	If the M-UDCP supports the Full Screen Window Type and if that Window Type is requested by the Card via the open_mmi_req() APDU the M-UDCP SHALL present the MMI dialog in an opaque window.	HPIA	9.5.1			C-M	C-M	Host Application Information and MMI

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
DApAi.31	If the M-UDCP supports the Overlay Window Type and if that Window Type is requested by the Card via the open_mmi_req() APDU the M-UDCP SHALL present the MMI dialog in an opaque window which is large enough to contain the MMI message but does not fill the entire viewable area.	HPIA	9.5.1			C-M	C-M	Host Application Information and MMI
DApAi.32	If the M-UDCP supports the Multiple Windows Type and if that Window Type is requested by the Card via the open_mmi_req() APDU the M-UDCP SHALL present each subsequent MMI dialog, up to the maximum number conveyed, in an Overlay Window. The M-UDCP SHALL support a method for navigating between the different windows.	HPIA	9.5.1			C-M	C-M	Host Application Information and MMI
DApAi.33	The M-UDCP SHALL support at a minimum the Baseline HTML Profile, except that 480i displays SHALL have a minimum resolution of 32 characters X 16 lines. The Baseline HTML Profile is defined in Annex A of HPIA.	HPIA	9.5.1			M	M	Host Application Information and MMI
DApAi.14	The M-UDCP SHALL be process the application_info_cnf() APDU when received. The syntax of this APDU is shown in section 7.5.2 of HPIA.	HPIA	9.5.2			M	M	Host Application Information and MMI
DApAi.7	The M-UDCP SHALL recognize at least the following application types: Conditional Access (00), Host / Card Pairing Information (01), Network Interface- SCTE 55-2 (03), Network Interface –SCTE 55-1 (04) Copy Protection (05)	HPIA	9.5.2			M	M	Host Application Information and MMI
DApAi.34	The M-UDCP SHALL replace the default generic identifier of the Card's application with the received application name in the application_name_byte field of the application_info_cnf() APDU. Note: The application name, when selected by the user, triggers a M-UDCP initialized MMI dialog.	HPIA	9.5.2			M	M	Host Application Information and MMI
DApAi.35	The M-UDCP SHALL be capable of displaying at least eight different Card application name strings in its top menu.	HPIA	9.5.2			M	M	Host Application and MMI
	The application name length SHALL be limited to 32 characters.	HPIA	9.5.2					
DApAi.36	The M-UDCP SHALL use the application URL in a server_query() APDU to initialize an MMI dialog with the Card application, when an object identified by either the application name or the application URL is selected in the Host menu.	HPIA	9.5.2			M	M	Host Application Information and MMI
DApAi.15	The M-UDCP SHALL send a server_query() APDU to the Card to request the information in the Card file server system pointed by a specific URL.	HPIA	9.5.3			M	M	Host Application Information and MMI

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
	The Card locates the requested data and provides it back to the Host in the server_reply() APDU.	HPIA	9.5.3					
DApAi.16	The M-UDCP SHALL process and display the data returned in the server_reply() APDU in a timely manner.	HPIA	9.5.4			M	M	Host Application Information and MMI
DApAi.17	The M-UDCP SHALL support the syntax of the server_query() APDU that is found in section 9.5.3 of HPIA.	HPIA	9.5.3			M	M	Host Application Information and MMI
DApAi.18	A M-UDCP not supporting headers SHALL set the header_length field of the server_query() APDU to zero.	HPIA	9.5.3			M	M	Host Application Information and MMI
DApAi.19	After receiving a server_reply from the Card the M-UDCP MAY send data to the Card using a server_query APDU.	HPIA	9.5.3			O	O	Host Application Information and MMI
DApAi.20	When the M-UDCP is sending data to the Card after receiving a server_reply the last part of the URL contains a list of name-value pairs separated by “&”s. This list is preceded by a “?” A properly constructed URL to the M-Card would be: CableCARD///path/file?name1=value1&name2=value2&… Note: Such a URL sent to an application on the Card as a response to a server_reply would cause the name-value pairs to be processed by the application. Data entered and selected at the M-UDCP may be sent to the Card through the use of these name-value pairs as part of the URL in a server_query object.	HPIA	9.5.4			M	M	Host Application Information and MMI
DapAi.23	The M-UDCP SHALL record the URL sent by the Card in the application_info_cnf() APDU and playback the URL recorded from the Card in the url_byte field of the server_query() APDU.	HPIA	9.5.3			M	M	Host Application Information and MMI
DapAi.24	The M-UDCP SHALL use ”CableCARD” as the access indicator when communicating to an M-Card operating in M-Mode.	HPIA	9.5.3			M	M	Host Application Information and MMI
DApAi.21	The M-UDCP SHALL support the server_reply() APDU having the syntax described in section 9.5.4 of reference HPIA.	HPIA	9.5.4			M	M	Host Application Information and MMI
DApAi.22	In the server_reply() APDU, the M-UDCP SHALL treat a header_length field of zero as indication that the Card does not support headers.	HPIA	9.5.4			M	M	Host Application Information and MMI
Application Layer - Conditional Access Support								
DApCa.2	The M-UDCP SHALL support one active Conditional Access Support resource.	HPIA	9.7 Table 9.7-2			M	M	Host Conditional Access Resource
	All CA applications create a session to Conditional Access Support resource as soon as they have completed their Application Information phase of initialization.	HPIA	9.7					
DApCa.5	Once a session to the Conditional Access Support resource is opened, the M-UDCP SHALL send ca_info_inq(). ca_info_inq() has structure shown in the table 9.7-3 of HPIA.	HPIA	9.7.1			M	M	Host Conditional Access Resource

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
	In response to ca_info_inq, the Card sends ca_info().	HPIA	9.7.2					
DApCa.7	The M-UDCP SHALL send CA_PMT to the connected CA application in order to indicate which elementary stream is selected by the user and how to find the corresponding ECM.	HPIA	9.7.3			M	M	Host Conditional Access Resource
DApCa.9	When the user selects several programs, then the M-UDCP SHALL send several CA PMT objects. The M-UDCP MAY decide to send the CA_PMT() to all connected CA applications or preferably only to the applications supporting the same CA_system_id value as the value given in the CA_descriptors of the selected elementary streams. Ca_pmt() has the structure shown in the table 9.7-5 or 9.7-6 of HPIA.	HPIA	9.7.3			M	M	Host Conditional Access Resource
DApCa.10	The M-UDCP SHALL send a new CA_PMT or a new list of CA_PMT when: - the user selects another program - the version_number changes - the current_next_indicator changes The M-UDCP SHALL construct the ca_pmt() APDU structure as shown in the table 9.7-5 or 9.7-6 of HPIA.	HPIA	9.7.3			M	M	Host Conditional Access Resource
DApCa.12	The M-UDCP SHALL use the following ca_pmt_cmd_id values in ca_pmt(): ok_descrambling(01), ok_mmi(02), query(03), not_selected(04) Reserved (other values).	HPIA	9.7.3			M	M	Host Conditional Access Resource
	If the Card received CA_PMT with ok_descrambling. it can start descrambling the program or start an MMI dialogue immediately.	HPIA	9.7.3					
DApCa.22	When the Card firsts receives ca_pmt_cmd_id = “ok_mmi” it can begin a MMI dialog but can not begin descrambling until receiving another CA_PMT object with the ca_pmt_cmd_id = “ok_descrambling”. In this case the M-UDCP SHALL guarantee that a MMI session can be opened by the CA application.	HPIA	9.7.3			C-M	C-M	Vendor Documentation Indicating Compliance
	If the Card receives CA_PMT with ok_mmi, it can start a MMI dialogue but will not start descrambling.	HPIA	9.7.3					
	If the Card receives CA_PMT with query, it sends CA_PMT_REPLY and is not allowed to start descrambling or MMI dialogue.	HPIA	9.7.3 9.7.4					
	If the Card receives CA_PMT with not_selected, it will close any MMI dialogue it has opened.	HPIA	9.7.3					
	When ca_enable in ca_pmt_reply() at program level and elementary stream level are present, only ca_enable at ES level applies for that elementary stream.	HPIA	9.7.4					

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
DApCa.19	When the ca_enable field in ca_pmt_reply() is not present, the M-UDCP SHALL not interpret the ca_pmt_reply object.	HPIA	9.7.4			M	M	Host Conditional Access
	Possible CA_enable in ca_pmt_reply() values are: Descrambling possible(01), Descrambling possible under conditions (purchase dialogue) (02), Descrambling possible under conditions (technical dialogue) (03), Descrambling not possible (because no entitlement) (71), Descrambling not possible (for technical reasons) (73).	HPIA	9.7.4					
DApCa.21	Where the M-UDCP cannot support descrambling of different elementary streams by different Cards then it MAY take as the CA_enable value for the program of the lowest of the CA_enable values returned for each elementary stream of the program.	HPIA	9.7.4			O	O	Vendor Documentation Indicating Compliance
DApCa.24	The M-UDCP SHALL provide the Conditional Access Support Resource id = 0x00030081 (class 3, type 2, version 1).	HPIA	9.7			M	M	Host Conditional Access Resource
DApCa.25	The M-UDCP SHALL support the CA_PMT APDU having the syntax described in section 9.7.3 Table 9.7-5 of HPIA.	HPIA	9.7.3 Table 9.7-5			M	M	Host Conditional Access Resource
DApCa.26	Each transport stream SHALL be associated by the ca_pmt() APDU with the associated Local Transport Stream Id (LTSID)	HPIA	9.7			M	M	Host Conditional Access Resource
DApCa.27	Each transport stream SHALL be controlled by the ca_pmt() APDU with the associated Local Transport Stream Id (LTSID)	HPIA	9.7			M	M	Host Conditional Access Resource
DApCa.28	The M-UDCP SHALL follow the processing rules for the ca_pmt() APDU as defined in 7.7.3.1 in HPIA.	HPIA	9.7.3.1			M	M	Host Conditional Access Resource
DApCa.29	The M-UDCP SHALL send a new ca_pmt() APDU when: - the user selects another program - the version_number changes - the current_next_indicator changes	HPIA	9.7.3.1			M	M	Host Conditional Access Resource
DApCa.30	The M-UDCP SHALL only include CA descriptors in the ca_pmt() APDU, and SHALL not include any other descriptors from the PMT.	HPIA	9.7.3.1			M	M	Host Conditional Access Resource
DApCa.31	The ca_pmt() APDU contains CA_descriptors from the PMT of a selected program(s). If several programs are selected, then the M-UDCP SHALL send a ca_pmt() APDU for each program to the Card.	HPIA	9.7.3.1			M	M	Host Conditional Access Resource
DApCa.32	When a CA descriptor is present at the elementary stream level the M-UDCP SHALL apply that CA descriptor to the elementary stream.	HPIA	9.7.3.1			M	M	Host Conditional Access Resource
DApCa.33	CA descriptors in the ca_pmt() APDU SHALL always appear at the same program and elementary stream levels as they originally appeared in the program's PMT.	HPIA	9.7.3.1			M	M	Host Conditional Access Resource

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
DApCa.34	Program level CA descriptors from a program's PMT SHALL continue to be provided at the program level in the ca_pmt() APDU .	HPIA	9.7.3.1			M	M	Host Conditional Access Resource
DApCa.35	CA descriptors from the program's PMT SHALL not be replicated at the elementary stream level, even if the M-UDCP elects to only request decryption of individual streams from that program.	HPIA	9.7.3.1			M	M	Host Conditional Access Resource
DApCa.36	The M-UDCP SHALL carry the program_index in the ca_pmt() APDU to allow the Card to maintain a similar index table to track the assignments that it receives from the M-UDCP.	HPIA	9.7.3.1			M	M	Host Conditional Access Resource
DApCa.37	The M-UDCP SHALL update assignments to each program_index as old programs are replaced by new programs, thereby maintaining the total number of active programs within the M-CARD's limitations.	HPIA	9.7.3.1			M	M	Vendor Documentation Indicating Compliance
DApCa.38	The M-UDCP SHALL assign a transaction_id to each ca_pmt() APDU .	HPIA	9.7.3.1			M	M	Host Conditional Access Resource
DApCa.39	The M-UDCP SHALL increment the transaction_id with every ca_pmt() APDU it sends.	HPIA	9.7.3.1			M	M	Host Conditional Access Resource
DApCa.40	The M-UDCP SHALL maintain a separate transaction_id counter for each program index, so that the transaction_ids increment independently for each index.	HPIA	9.7.3.1			M	M	Vendor Documentation Indicating Compliance
DApCa.41	When the M-UDCP has not yet acquired the Source ID, the M-UDCP MAY set the Source ID value to 0 until the Source ID information is available.	HPIA	9.7.3.1			O	O	Vendor Documentation Indicating Compliance
DApCa.42	The M-UDCP SHALL replace the previously set value of 0 to that of the received Source ID value.	HPIA	9.7.3.1			C-M	C-M	Resource Vendor Documentation Indicating Compliance
DApCa.43	If the M-UDCP performs any filtering of elementary streams, it SHALL utilize the request_pids() APDU to determine what PIDS to filter and to accept and process the request_pids_cnf() APDU from the M-Card as defined in section 9.12.7 and 9.12.8 of HPIA.	HPIA	9.7 9.12			C-M	C-M	Vendor Documentation Indicating Compliance
Application Layer - Host Control								
	It is anticipated that the M-UDCP will perform its internal tuning operation without requiring opening a session to the Host Control resource. Therefore, when it receives any inband tuning APDUs from the Card it can decide whether to grant them or not. Typically, unless either a Homing resource has been opened or the M-UDCP is in standby state or the Card has transmitted a firmware_upgrade, the M-UDCP will be unable to grant the Card access to the inband tuner.	HPIA	9.8			I	I	
DApHc.1	The M-UDCP SHALL provide the Host Control Resource.	HPIA	9.3.1 9.8			M	M	OOB Host Control
DApHc.2	The M-UDCP SHALL support one Host Control Resource session.	HPIA	9.3.1 Table 9.3-4			M	M	OOB Host Control

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
DApHc.37	The M-UDCP in M-Mode SHALL provide Host Control resource id 0x00200081 (class 32, type 2, version 1)	HPIA	9.8			M	M	OOB Host Control
	The Card will have the Host Control resource open for control of the OOB receiver and will leave it open independent of the operation of the Homing resource.	HPIA	9.8					
DApHc.20	In response to an oob_tx_tune_req() from the Card, the M-UDCP SHALL respond with the oob_tx_tune_cnf() APDU containing a status_field value of 'Tuning denied - Rf tx not physically available' (01). oob_tx_tune_cnf has the structure described in section 9.8.2 of reference HPIA.	HPIA	9.8.2			M	M	OOB Host Control
	oob_tx_tune_req () has the structure shown in the table found in section 9.8.1 of reference HPIA.	HPIA	9.8.1					
	The Card will use the oob_rx_tune_req object to set up the M-UDCPs RF receiver.	HPIA	9.8.1					
DApHc.30	The M-UDCP after the requested OOB frequency has been tuned and acquired (“tune time”) or 500msec has elapsed since receiving the Request (whichever comes first), SHALL respond with the oob_rx_tune_cnf() APDU to the oob_rx_tune_req.	HPIA	9.8.3			M	M	OOB Host Control
DApHc.31	The oob_rx_tune_cnf() object SHALL have the structure described in section 9.8.3 of reference HPIA. Allowable values of status_field in the oob_rx_tune_cnf() object SHALL be: Tuning granted (00) Tuning denied – Rf rx not physically available (01) Tuning denied – rf rx busy (02) Tuning denied – invalid parameters (03) Tuning denied – other reasons (04) Reserved (05-FF)	HPIA	9.8.3			M	M	OOB Host Control
DapHc.36	When the M-UDCP denies an OOB RX tune request the M-UDCP SHALL respond to an oob_rx_tune_req() APDU with an RF_RX_frequency_value outside the range of 70 MHz to 130 MHz, with the oob_rx_tune_cnf() APDU and status_field set to Tuning Denied.	HPIA	9.8.3			M	M	OOB Host Control
DApHc.41	The M-UDCP SHALL transmit the OOB_RX_tune_cnf() APDU only after either the requested frequency has been tuned and acquired (“tune time”), or 500 msec has elapsed since receiving the request, whichever comes first.	HPIA	9.8.4			M	M	OOB Host Control
	The Card will use the inband_tune_object to request the M-UDCP to tune the inband QAM tuner. The syntax of this object is in section 9.8.5 of reference HPIA.	HPIA	9.8.5					

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
	The Card will set the modulation_value in inband_tuning_req to one of the following values: QAM-64 (00), QAM-256(01), 8-VSB(02).	HPIA	9.8.5					
DApHc.42	After receiving the inband_tuning_req, the M-UDCP in M-Mode SHALL respond with the inband tuning_cnf() APDU object. The structure of this object is detailed in the table 9.8-15 of section 9.8.6 of HPIA	HPIA	9.8.6 Table 9.8-15			M	M	Inband Host Control and Card Firmware Upgrade
DApHc.35	The inband_tune_cnf() APDU SHALL only be transmitted after either the requested frequency has been tuned and the QAM signal is locked or 500msec has elapsed since receiving the Request, whichever comes first.	HPIA	9.8.6			M	M	Inband Host Control and Card Firmware Upgrade
DApHc.33	The tune_status field of the inband_tuning_cnf() APDU SHALL contain one of the following responses: Tuning accepted (00) Invalid frequency (01) Invalid modulation (02) Hardware failure (03) Tuner busy (04) Reserved (05-FF)	HPIA	9.8.6			M	M	Inband Host Control and Card Firmware Upgrade
DApHm.44	The M-UDCP SHALL perform a PCMCIA reset on the Card, if the download_timeout_period expires	HPIA	9.18.3			M	M	Inband Host Control and Card Firmware Upgrade
Application Layer - System Time								
DApSt.1	The M-UDCP SHALL provide a system time resource id 0x00240041 (class 36, type 1, version 1).	HPIA	9.10			M	M	Host System Time
DApSt.2	The M-UDCP SHALL support one system time resource session as defined in Table 9.3-4 of HPIA.	HPIA	9.3.1			M	M	Host System Time
	The Card creates a session to the system time resource and then inquires the current time with system_time_inq( ) APDU The system_time_inq() APDU has the structure shown in Table 9.10-3 of HPIA.	HPIA	9.10					
DApSt.6	In response to system_time_inq() ADPU ,if response_interval is zero, then the M-UDCP SHALL reply with a single system_time() APDU immediately.	HPIA	9.10			M	M	Host System Time
DApSt.7	In response to system_time_inq() APDU, if response_interval is non-zero then the M-UDCP SHALL respond with a system_time() APDU immediately, followed by further system_time() APDU objects every response_interval seconds.	HPIA	9.10			M	M	Host System Time
DApSt.8	The M-UDCP SHALL construct the system_time() APDU in accordance with the structure shown in section 9.10.2 of HPIA.	HPIA	9.10.2			M	M	Host System Time
Application Layer – MMI								

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
DApMi.1	The M-UDCP SHALL support the Man Machine Interface Resource: MMI, class 64, Type 2, Version 1, Identifier 0x00400081.	HPIA	9.11			M	M	Host Data Channel Multi-Layer
DApMi.12	The M-UDCP SHALL support a navigation method to allow user navigation with the MMI resource defined in reference HPIA.	HPIA	9.11			M	M	Host Application Information and MMI
DApMi.2	The M-UDCP SHALL be capable of processing the open_mmi_req() APDU from the Card. open_mmi_req() has the syntax shown in section 9.11.1 of HPIA.	HPIA	9.11.1			M	M	Host Application Information and MMI
	If the M-UDCP supports more than one MMI dialog at the same time, the Card can send another open_mmi_req() before it closes the previous one.	HPIA	9.11.1			I	I	
DApMi.3	The M-UDCP MAY implement the following displays found in the display_type values: 0: Full screen 1: Overlay 2: New window 3-F: Reserved	HPIA	9.11.1			O	O	Host Application Information and MMI
DApMi.4	The M-UDCP SHALL reply to an open_mmi_req() with an open_mmi_cnf() APDU to confirm the status of the request. open_mmi_cnf() APDU has the syntax found in section table 9.11-4 of HPIA.	HPIA	9.11.2 Table 9.11-4			M	M	Host Application Information and MMI
DApMi.5	The M-UDCP SHALL support the open_status field of the open_mmi_cnf() APDU: 00: OK – Dialog opened 01: Request denied – Host busy 02: Request denied – Display type not supported 03: Request denied – no video signal 04: Request denied – no more windows available 05: FF Reserved	HPIA	9.11.2			M	M	Host Application Information and MMI
DApMi.6	The M-UDCP SHALL issue a dialog_number from an eight-bit cyclic counter that identifies each open_mmi_cnf() APDU and allows the Card to close the MMI dialog.	HPIA	9.11.2			M	M	Host Application Information and MMI
	The Card will send a close_mmi_req() APDU to the M-UDCP to close the MMI dialog previously opened with an open_mmi_req() APDU.	HPIA	9.11.3			I	I	
	The Card uses the close_mmi_req() APDU syntax found in section 9.11.3 of reference HPIA.	HPIA	9.11.3			I	I	
DApMi.7	The M-UDCP SHALL reply to a close_mmi_req() APDU with a close_mmi_cnf() APDU to report the status of the close operation, with the syntax found in section 9.11.4 of HPIA.	HPIA	9.11.4			M	M	Host Application Information and MMI
DApMi.34	The M-UDCP SHALL open the MMI dialog on all of its outputs when the M-UDCP is operating with an M-Card.	HPIA	9.11.2			M	M	Host Application Information and MMI

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
DApMi.35	The M-UDCP SHALL close all MMI dialog messages it opened on all of it's outputs, corresponding to the specific dialog_number when operating with an M-Card.	HPIA	9.11.4			M	M	Host Application Information and MMI
DApMi.11	Under the Baseline HTML Profile the M-UDCP SHALL visibly display all text in the MMI message on the screen.	HPIA	Annex A A.1.1			M	M	Host Application Information and MMI
DApMi.13	If the M-UDCP adds navigation buttons around the MMI screen, those buttons SHALL not obscure any MMI text.	HPIA	Annex A A.1.1			C-M	C-M	Host Application Information and MMI
DApMi.14	Under the Baseline HTML Profile the M-UDCP Windows SHALL be opaque.	HPIA	Annex A A.1.1			M	M	Host Application Information and MMI
DApMi.15	Under the Baseline HTML Profile the M-UDCP SHALL support minimum of 32 characters per line and a minimum of 16 lines of characters in a window without horizontal and vertical scrolling. The vertical height of the characters SHALL be approximately 1/18 of the screen height.	HPIA	Annex A A.1.2			M	M	Host Application Information and MMI
DApMi.16	Under the Baseline HTML Profile, the M-UDCP MAY render text and background colors as requested in the HTML data from the Card. If the HTML data does not include a text and/or background color command, or the M-UDCP does not support the text and/or background color command, the M-UDCP SHALL use either: 1) black text on a light gray background 2) or white text on a black background.	HPIA	Annex A A.1.3			M	M	Host Application Information and MMI
DApMi.18	If the M-UDCP supports either the background color or text color command then it SHALL use either black (#000000) text on a light gray (#C0C0C0) background or white (#FFFFFF) text on a black (#000000) background. If the M-UDCP supports either the background color or text color command then it SHALL support both of the commands. The M-UDCP should not support only one of the commands.	HPIA	Annex A A.1.3			M	M	Host Application Information and MMI
DApMi.19	Under the Baseline HTML Profile, the M-UDCP MAY render the unvisited link color as requested in the HTML data from the Card. If the HTML data does not include an unvisited link color command, or the M-UDCP does not support the unvisited link color command, the M-UDCP SHALL use blue.	HPIA	Annex A A.1.4			C-M	C-M	Host Application Information and MMI
DApMi.20	Under the Baseline HTML Profile, the M-UDCP MAY align paragraphs as requested by the HTML data from the Card. If the HTML data does not include a paragraph alignment command, or the M-UDCP does not support the paragraph alignment command, the M-UDCP SHALL use a LEFT paragraph alignment.	HPIA	Annex A A.1.5			C-M	C-M	Host Application Information and MMI
DApMi.21	The M-UDCP MAY provide support for images.	HPIA	Annex A A.1.6			O	O	Host Application Information and MMI

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
DApMi.22	The M-UDCP MAY provide support for Tables.	HPIA	Annex A A.1.7			O	O	Host Application Information and MMI
DApMi.23	The M-UDCP MAY provide support for Forms.	HPIA	Annex A A.1.8			O	O	Host Application Information and MMI
DApMi.24	The Baseline HTML Profile does not define how a hyperlink is navigated and selected. The M-UDCP SHALL provide some navigation/selection mechanism to identify the user intention and forward the selected link to the Card module using the server_query() APDU.	HPIA	Annex A A.2.1			M	M	Host Application Information and MMI
DApMi.25	The M-UDCP SHALL implement all required HTML Keywords in Annex A of HPIA.	HPIA	Annex A A.2.3			M	M	Host Application Information and MMI
DApMi.26	The M-UDCP SHALL recognize and display all Characters in Annex A.3 of HPIA.	HPIA	A A.3			M	M	Host Application Information and MMI
DApMi.31a	The M-UDCP SHALL not be adversely affected by any optional HTML elements implemented by the Card as defined in Annex A of HPIA.	HPIA	Annex A			M	M	Host Application Information and MMI
Application Layer – Homing								
DApHm.1	The M-UDCP SHALL support Homing resource id 0x00110042 (class 17, type 1, version 2).	HPIA	9.18.4.1			M	M	Inband Host Control and Card Firmware Upgrade
DApHm.2	The M-UDCP SHALL support the "immediate" mode of Homing in both the active and standby power states.	HPIA	9.18.4.1			M	M	Inband Host Control and Card Firmware Upgrade
DAPHm.47	The M-UDCP SHALL support the "delayed" mode of Homing by sending the open_homing() APDU when the M-UDCP is in a standby state.	HPIA	9.18.1.1.1.1			M	M	In band Host Control and Host CableCARD Firmware Upgrade
	The Card will open the Homing resource when it requires a firmware upgrade or requires a service.	HPIA	9.18.4.1					
DApHm.41	The M-UDCP SHALL not initiate any new sessions or any application layer operations after receiving a firmware_upgrade() APDU until either the firmware_upgrade_complete() APDU is received or the Card times out.	HPIA	9.18.3			M	M	Inband Host Control and Card Firmware Upgrade
DApHm.42	The M-UDCP SHALL maintain all session connections so that if the Card cancels the firmware upgrade, normal operation can continue.	HPIA	9.18.3			M	M	Inband Host Control and Card Firmware Upgrade
DApHm.43	The M-UDCP SHALL respond to any session or application layer operation initiated by the Card and perform all descendant operations consistent with normal Host-Card interface. Note: This includes timeout and reset operation and the initiation of required session and application layer operations.	HPIA	9.18.3			M	M	Inband Host Control and Card Firmware Upgrade
DApHm.45	If the Card sends a firmware_upgrade_complete() APDU with No Reset Required, then the M-UDCP SHALL resume normal operation with the Card in all respects, including timeout and reset operation.	HPIA	9.18.3			M	M	Inband Host Control and Card Firmware Upgrade

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
DApHm.4	The M-UDCP SHALL send open_homing() to the Card when it enters the standby state, either from power up or from user action. It SHALL send this independent of whether the Host Control resource has a session active.	HPIA	9.18.4.2			M	M	Inband Host Control and Card Firmware Upgrade
DApHm.5	The M-UDCP SHALL send the open_homing() APDU with the structure shown in table 9.18-3 of HPIA.	HPIA	9.18.4.2			M	M	Inband Host Control and Card Firmware Upgrade
	The Card will send open_homing_reply() to the M-UDCP to acknowledge receipt of the open_homing().	HPIA	9.18.4.3					
	open_homing_reply() has the structure shown in the table 9.18-4 of HPIA.	HPIA	9.18.4.3					
DApHm.8	The M-UDCP SHALL send homing_active() APDU to the Card to inform that the homing request has been activated. Note: This should be a response to the open_Homing_reply() APDU.	HPIA	9.18.4.4			M	M	Inband Host Control and Card Firmware Upgrade
DApHm.9	The M-UDCP SHALL have the structure for homing_active() APDU as shown in table 9.18-5 of HPIA.	HPIA	9.18.4.4			M	M	Inband Host Control and Card Firmware Upgrade
DApHm.10	If the M-UDCP was not informed that a firmware upgrade was in progress, then it SHALL have the capability to close the homing state, which is achieved by sending homing_cancelled() APDU to the Card.	HPIA	9.18.4.5			M	M	Inband Host Control and Card Firmware Upgrade
DApHm.11	The M-UDCP SHALL send homing_cancelled() APDU with the structure shown in the table 9.18-6 of HPIA	HPIA	9.18.4.5			M	M	Inband Host Control and Card Firmware Upgrade
	When the Card no longer needs the homing function, then it can transmit a homing_complete() to the M-UDCP The Card can close the session or not.	HPIA	9.18.4.6					
	homing_complete() APDU has the structure shown in table 9.18-7 of HPIA.	HPIA	9.18.4.6					
	When the Card needs to perform a firmware upgrade, it will transmit the firmware_upgrade() APDU to the M-UDCP.	HPIA	9.18.4.7					
	firmware_upgrade() APDU has the structure shown in table 9.18-8 of HPIA.	HPIA	9.18.4.7					
DApHm.33	The M-UDCP SHALL be capable of recognizing the set upgrade_source field in firmware_upgrade() APDU as one of the following values: Unknown(00), QAM Inband Channel (01), QPSK OOB Channel (02), Reserved (03-FF).	HPIA	9.18.4.7			M	M	Inband Host Control and Card Firmware Upgrade

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
DApHm.34	The M-UDCP SHALL accept the following values of timeout_type in firmware_upgrade(): Both timeouts(00), Transport timeout only(01), Download timeout only(02), No timeout(03), Reserved (04-FF).	HPIA	9.18.4.7			M	M	Inband Host Control and Card Firmware Upgrade
DApHm.35	The M-UDCP SHALL use the download_timout_period as the amount of time, in seconds, after the M-UDCP has received the firmware_upgrade APDU it will use to determine the Card has become unstable.	HPIA	9.18.4.7			M	M	Inband Host Control and Card Firmware Upgrade
DApHm.36	When the download_timeout_period expires the M-UDCP SHALL perform a PCMCIA reset on the Card.	HPIA	9.18.4.7, 9.18.3			M	M	Inband Host Control and Card Firmware Upgrade
DApHm.37	The M-UDCP SHALL reset it's timer download_timeout_period timer if another firmware_upgrade() APDU is received from the Card before the firmware_upgrade_complete() is received.	HPIA	9.18.4.7			M	M	Inband Host Control and Card Firmware Upgrade
DApHm.38	The M-UDCP SHALL accept a download_timeout_period() of 0000 as an infinite timeout period.	HPIA	9.18.4.7			M	M	Inband Host Control and Card Firmware Upgrade
DApHm.18	After receiving firmware_upgrade() APDU, if the upgrade_source is equal to the QAM inband channel(01), then the M-UDCP in active or standby power state SHALL immediately give access to the inband tuner through the Host Control resource inband_tune_req() APDU.	HPIA	9.18.4.7			M	M	Inband Host Control and Card Firmware Upgrade
DApHm.46	The M-UDCP SHALL not interrupt a firmware upgrade until it receives the firmware_upgrade_complete() APDU.	HPIA	9.18.4.7			M	M	Inband Host Control and Card Firmware Upgrade
DApHm.19	After receiving firmware_upgrade() APDU, if the M-UDCP is not in the standby mode, then it SHALL display the user_notification_text.	HPIA	9.18.4.7			M	M	Inband Host Control and Card Firmware Upgrade
	Any user_notification_text being displayed upon reception of the firmware_upgrade_complete() APDU should be removed.	HPIA	9.18.4.7					
DApHm.39	The user_notification_text in firmware_upgrade() SHALL be in ISO-8859-1.	HPIA	9.18.4.7			M	M	Inband Host Control and Card Firmware Upgrade
DApHm.21	The M-UDCP SHALL be able to decode and display texts in ISO-8859-1.	HPIA	9.18.4.7			M	M	Inband Host Control and Card Firmware Upgrade
DApHm.23	The M-UDCP SHALL send firmware_upgrade_reply() APDU in response to the firmware_upgrade(). firmware_upgrade_reply() APDU has the structure shown in the table 9.18-9 of HPIA.	HPIA	9.18.4.8			M	M	Inband Host Control and Card Firmware Upgrade
	The M-UDCP will not start the download operation until it receives firmware_upgrade_reply() APDU.	HPIA	9.18.4.8					
	After the Card has complete its upgrade, it will transmit the firmware_upgrade_complete() APDU to the M-UDCP	HPIA	9.18.4.9					

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
	firmware_upgrade_complete() APDU has the structure shown in table 9.19-10 of HPIA.	HPIA	9.18.4.9					
DApHm.28	The M-UDCP SHALL be capable of acting according to the following values of reset_request_status in firmware_upgrade_complete() APDU: PCMCIA reset requested(00), Card reset requested(01), No reset requested(02), Reserved (03-FF).	HPIA	9.18.4.9			M	M	Inband Host Control and Card Firmware Upgrade
	If the Card wishes to cancel the firmware upgrade, it can send the firmware_upgrade_complete() APDU with no reset requested.	HPIA	9.18.4.9					
DApHm.32	When the reset_request_status is no_reset_requested, the M-UDCP MAY take control of the tuner if the source was inband.	HPIA	9.18.4.9			O	O	Inband Host Control and Card Firmware Upgrade
Application Layer – Device Capability Discovery								
DapHDis.1	The M-UDCP SHALL support only one "CARD RES" Resource session at a time.	HPIA	9.3.1			M	M	Host Device Capability Discovery
DapHDis.2	The M-UDCP SHALL not remove the PIDs from each transport stream that were reported by the Card as required through the Card Capability Discovery resource, "CARD RES".	HPIA	9.12			M	M	Host Device Capability Discovery
DapHDis.3	The M-UDCP SHALL notify the user in the event that the Card is unable to meet the stream program or PID processing requirements that a user has requested.	HPIA	9.12			M	M	Host Device Capability Discovery
DapHDis.4	Once the M-UDCP receives the stream_profile() APDU from the Card it SHALL respond with the stream_profile_cnf() APDU with the structure defined in Table 9.12-4 of HPIA.	HPIA	9.12.2			M	M	Host Device Capability Discovery
DapHDis.5	Once the M-UDCP receives the program_profile() APDU from the Card it SHALL respond with the programs_profile_cnf() APDU with the structure defined in table 9.12-6 of HPIA.	HPIA	9.12.4			M	M	Host Device Capability Discovery
DapHDis.6	Once the M-UDCP receives the es_profile() APDU from the Card it SHALL respond with the es_profile_cnf() APDU with the structure defined in table 9.12-8 of HPIA.	HPIA	9.12.6			M	M	Host Device Capability Discovery
	The maximum number of elementary streams does not include those PIDs which are consumed internally by the Card for internal Card applications. This number refers only to PIDs of programs that are consumed by the M-UDCP in M-Mode for viewing or storage. If the Card requires additional PIDs for internal consumption, they are not to be included in the value reported as a part of the es_profile() APDU.	HPIA	9.12					

	Feature	Spec	Ref	Support	Pass/Fail			ATP Test Name
						UHMT	UHMS	
DapHDis.7	The M-UDCP SHALL ask the Card for the non-program PIDs that it must receive if the M-UDCP has to perform filtering (removing transport packets corresponding to PIDs that it does not need) to keep the bandwidth below the maximum of the interface.	HPIA	9.12.7			C-M	C-M	Host Device Capability Discovery
DapHDis.8	The M-UDCP SHALL not filter out/ remove the PIDs as required by the Card.	HPIA	9.12.7			C-M	C-M	Host Device Capability Discovery
DapHDis.9	The request_pids() APDU SHALL be used by the M-UDCP to indicate filtering status and to request a list of non-program PIDs that SHALL not be filtered with the structure defined in table 9.12-9 of HPIA.	HPIA	9.12.7			M	M	Host Device Capability Discovery

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name

3.1.4 Extended Channel Protocol

Extended Channel – Link Layer								
ExchL.3	The M-UDCP SHALL be capable of fragmenting an outgoing datagram PDU into Link PDUs.	HPIA	10.7.2			M	M	Host Extended Channel Link Layer
ExchL.7	The Host SHALL not use a flow_id of zero. It is reserved and is not to be assigned.	HPIA	10.7.2			M	M	Host Extended Channel Link Layer
Extended Channel – Link Layer								
ExchF.39	The M-UDCP SHALL use the structure shown in section 10.6.2 of reference HPIA Table 10.6-2.	HPIA	10.7.2			M	M	Host Extended Channel Link Layer
ExchF.40	The M-UDCP use the first and last indicators (F and L bits) in the Interface Query Byte of the query byte for indicating fragmented datagrams on both the Extended and Data Channels.	HPIA	7.6.2			M	M	Host Extended Channel Link Layer
ExchF.41	Received datagram PDU fragments SHALL be reassembled into MPEG-2 table sections upon the service_type 0x00 MPEG section associated with the flow given by flow_id.	HPIA	10.7.2			M	M	SCTE 65 Service Information Delivered OOB
ExchF.42	The maximum size of the reassembled PDU (MPEG-2 table section) SHALL be 4,096 for any Service Type.	HPIA	10.7.2			M	M	SCTE 65 Service Information Delivered OOB
Extended Channel Flow (Support)								
	The Card is the link device for the QPSK modem.	HPIA	9.14					
ExchF.24	The M-UDCP SHALL provide the hardware necessary to support a QPSK downstream out-of-band channel for the Card.	HPIA	9.14			M	M	Host Extended Channel Link Layer
ExchF.1	The M-UDCP SHALL support the Extended_Channel_Support resource. The resource ID equals to 0x00a00041, Type 1 Version 1, as identified in table 9.14-1 of HPIA.	HPIA	9.14			M	M	Host Extended Channel Link Layer
ExchF.2	The M-UDCP SHALL send a new_flow_req() APDU to the Card to register a new flow with the link device. The new_flow_req() APDU object has the syntax illustrated in the table 9.14-3 of HPIA.	HPIA	9.14.1			M	M	Host Extended Channel Link Layer
ExchF.4	The service_type field in new_flow_req() APDU issued by the M-UDCP SHALL be: MPEG_section (0x00)	HPIA	9.14.1			M	M	Host Extended Channel Link Layer
ExchF.23	MPEG_Section datagram PDUs SHALL have the PID specified in corresponding new_flow_req() APDU by the M-UDCP.	HPIA	9.14.1			M	M	Host Extended Channel Link Layer
	The Card will support at least six concurrent MPEG_section service_type flows.	HPIA	9.14.1					
	The Card only forwards messages which pass the CRC check and discard table sections that are incomplete or fail the CRC check.	HPIA	9.14.1					

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
	The Card will support only 1 outstanding new_flow_req() transaction at a time.	HPIA	9.14.1					
	The Card will send a new_flow_conf() APDU with a status_field of 0x04 (network_busy) when additional new_flow_req() APDU messages are received and one is pending.	HPIA	9.14.1					
ExchF.27	The M-UDCP SHALL be capable of receiving the new_flow_cnf() APDU object.	HPIA	9.14.2			M	M	Host Extended Channel Link Layer
ExchF.28	The new_flow_cnf() APDU SHALL have the syntax of the table 9.14-6-of HPIA.	HPIA	9.14.2			M	M	Host Extended Channel Link Layer
ExchF.29	The M-UDCP SHALL decode the following values of status_field in the new_flow_cnf() APDU: Request_granted (0x00) Request_denied – Number of flows exceeded (0x01) Request_denied – Service type not available (0x02) Request_denied – Network unavailable or not responding (0x03) Request_denied – Network busy (0x04) Reserved or N/A (0x05-0xFF)	HPIA	9.14.2			M	M	Host Extended Channel Link Layer
ExchF.30	The M-UDCP SHALL interpret a value of zero in the flows_remaining field if no additional flows beyond the one currently requested can be supported by the Card.	HPIA	9.14.2			M	M	Host Extended Channel Link Layer
ExchF.11	The flow_id value in delete_flow_req() APDU SHALL match one of the registered data flows.	HPIA	9.14.3			M	M	Host Extended Channel Link Layer
ExchF.13	The M-UDCP SHALL issue/accept a Lost_flow_ind() APDU when the link device has lost the connection.	HPIA	9.14.5			M	M	Host Extended Channel Link Layer
ExchF.14	The flow_id value in Lost_flow_ind() SHALL match the flow for the link device.	HPIA	9.14.5			M	M	Host Extended Channel Link Layer
ExchF.32	The M-UDCP SHALL use the syntax of table 9.14-10 of HPIA to send/receive lost_flow_ind() APDU.	HPIA	9.14.5			M	M	Host Extended Channel Link Layer
ExchF.33	The M-UDCP SHALL receive the reason_field of the lost_flow_ind() APDU with the following values: Unknown or unspecified reason (0x00) IP address expiration (0x01) Network down or busy (0x02) Lost or revoked authorization (0x03) Reserved (0x04 – 0xFF)	HPIA	9.14.5			M	M	Host Extended Channel Link Layer
ExchF.15	The M-UDCP responds to lost_flow_ind() with a Lost_flow_cnf() APDU with corresponding flow_id value and status_field = 0x00 (Ack)	HPIA	9.14.6			M	M	Host Extended Channel Link Layer
	MPEG_section service_type is applicable only for flows between the Card's QPSK modem and the M-UDCP. The requested flow will be in the form of MPEG-2 table sections.	HPIA	9.14.1					

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
	The MPEG-2 CRC, when present will be checked in the Card and only messages that pass the CRC check will be forwarded to the M-UDCP. The M-UDCP may check the CRC.	HPIA	9.14.1					
ExchF.36	The M-UDCP SHALL not be adversely affected by the correctness or incorrectness of the 32-bit CRC present in MPEG_section Extended Channel data.	HPIA	9.14.1			M	M	SCTE 65 Service Information
ExchF.62	The M-UDCP SHOULD check the CRC to ensure invalid data is not processed.	Appendix A	R-376			O	O	SCTE 65 Service Information
ExchF.38	The M-UDCP SHALL process out-of-band System and Service Information that is sent across the Card interface in Extended Channel data flows, using Service_t ype = MPEG_section, as defined in [CCIF2.0] and [ANSI/SCTE 65].	HPIA	10.5			M	M	SCTE 65 Service Information
ExchF.56	The M-UDCP SHALL be capable of processing all profiles 1 through 6 as specified in [SCTE65]. Note: The set of MPEG-2 tables provided to support the navigation function in the Host device SHALL conform to one or more of the profiles specified in [SCTE65]. Informative note: Profiles 1 through 5 are compatible with Host devices deployed as of Jan 1, 2000. M-UDCP devices that are intended to be portable across the United States will need to function with any of the six profiles of [SCTE65]. For operational considerations of various profiles, see section A.3 in [SCTE65].	HPIA	10.5			M	M	SCTE 65 Service Information
ExchF.60	The M-UDCP SHALL not use OOB SI data received by any other method.	HPIA	10.8			M	M	OOB EAS Test
	Note: the Card MAY reformat the OOB SI data to meet the requirements of [SCTE65],	HPIA	10.8					
ExchF.61	The M-UDCP MAY use data received on OOB data streams that is outside of the [SCTE65] protocols.	HPIA	10.8			O	O	OOB EAS
ExchF.62	The M-UDCP SHALL not use OOB EAS messages received by any other method.	HPIA	10.9			M	M	OOB EAS
HSTCCP.8	The System Information tables (e.g., NTT, NIT and VCT) required to build the video channel map used for program navigation SHALL be stored in non-volatile memory in the M-UDCP.	Appendix A	R-362			M	M	Host Channel Change

3.1.5 In-Band Channel Support

HstIBCS.1	The M-UDCP SHALL process MPEG-2 compliant Transport Streams in accordance with ANSI/SCTE-54.	Appendix A	R-9			M	M	In-Band PSIP
HstIBCS.2	The M-UDCP SHALL process Video Transport Stream as specified in Section 2.4.2.3 of ISO/IEC 13818-1.	HPIL	5.1.1			M	M	In-Band PSIP

	Feature	Spec	Ref	Support	Pass/Fail			ATP Test Name
						UHMT	UHMS	
HstIBCS.3	The M-UDCP SHALL decode and display (if appropriate) Stream Types 0x02 and 0x80.	HPIL	5.8.2.1 and 5.8.2 Table 5.4			M	M	In-Band PSIP
HstIBCS.4	The M-UDCP SHALL decode and display (if appropriate) Stream Types 0x81, as specified in Section 3.6 of Annex A of ATSC Standard A/52 and as further constrained in Annex B of ATSC Standard A/53.	HPIL	5.8.2.2			M	M	In-Band PSIP
HstIBCS.6	The M-UDCP SHALL not be adversely affected by the presence of MPEG Registration Descriptors described in Section 2.6.8 of ISO/IEC 13818-1 present in either the inner or outer loop of the PMT.	HPIL	5.2.1			M	M	In-Band PSIP
HstIBCS.10	The M-UDCP MAY recognize audio elementary streams which conform to SCTE-54 2004 by the format identifier carried in the registration_descriptor of the Program Map Table (PMT) detailed in Section 2.4.4.8 of ISO/IEC 13818-1.	HPIL	5.8.3.6			O	O	In-Band PSIP
HstIBCS.16	The M-UDCP SHALL not be adversely affected by the presence of discontinuity_indicator in adaptation headers in TS packets of the PMT_PID. (Section 2.4.4.5 of ISO/IEC 13818-1).	HPIL	5.5			M	M	In-Band PSIP
HstIBCS.18	The M-UDCP SHALL not be adversely affected by the presence of Private table sections in addition to Program Map Tables sections present in TS packets on the PMT_PID.	HPIL	5.5			M	M	In-Band PSIP
HstIBCS.19	The M-UDCP SHALL interpret PSI with an average aggregate bit rate of 80,000bps for TS packets of PID 0x0000, PID 0x0001, and PMT_PID.	HPIL	5.5			M	M	In-Band PSIP
HstIBCS.183	The M-UDCP SHALL use the Presentation Time-Stamp (PTS) to perform A/V sync.	HPIL	5.6			M	M	In-Band PSIP
HstIBCS.47	The M-UDCP SHALL not be adversely affected by the presence of a rate of at least 250,000 bps for base_PID (0x1FFB) SI stream.	HPIL	5.7.1.2 Table 5.2			M	M	In-Band PSIP
HstIBCS.48	The M-UDCP SHALL not be adversely affected by the presence of a rate of at least 250,000 bps for EIT_PID SI stream.	HPIL	5.7.1.2 Table 5.2			M	M	In-Band PSIP
HstIBCS.49	The M-UDCP SHALL not be adversely affected by the presence of a rate of at least 250,000 bps for ETT_PID SI stream.	HPIL	5.7.1.2 Table 5.2			M	M	In-Band PSIP
HstIBCS.69	The M-UDCP SHALL support Program Association Table (PAT) with table ID = 0x00, PID = 0.	HPIL	5.8.1 Table 5.3			M	M	In-Band PSIP
HstIBCS.71	The M-UDCP SHALL use the PMT_PID field in the PAT to locate the TS_program_map_section ()s of the Program Map Table (PMT). The M-UDCP SHALL support such TS_program_map_section()s.	HPIL	5.8.1 Table 5.3			M	M	In-Band PSIP

	Feature	Spec	Ref	Support	Pass/Fail			ATP Test Name
						UHMT	UHMS	
HstIBCS.72	The M-UDCP SHALL not be adversely affected by the presence or absence of table sections not identified as required elsewhere in this document.	HPIL	5.8.1 Table 5.3			M	M	In-Band PSIP
HstIBCS.93	The M-UDCP SHALL not be adversely affected by the presence or absence of stream types not identified as required in this document.	HPIL	5.8.2, Table 5.4			M	M	In-Band PSIP
HstIBCS.123	The M-UDCP SHALL not be adversely affected by the presence or absence of the descriptor tag 0x09 = CA_descriptor().	HPIL	5.8.3, Table 5.5			M	M	Vendor Documentation Indicating Compliance
HstIBCS.125	The M-UDCP SHALL not be adversely affected by the presence or absence of the descriptor tag 0x0A = ISO_639_language_descriptor().	HPIL	5.8.3, Table 5.5			M	M	In-Band PSIP
HstIBCS.132	The M-UDCP SHALL not be adversely affected by the presence or absence of the descriptor tag 0x14 = association_tag_descriptor.	HPIL	5.8.3, Table 5.5			M	M	In-Band PSIP
HstIBCS.141	The M-UDCP SHALL support descriptor tag 0x86 = caption_service_descriptor.	HPIL	5.8.3, Table 5.5			M	M	Closed Captioning from a Digital Source
HstIBCS.143	The M-UDCP SHALL support descriptor tag 0x87 = content_advisory_descriptor().	HPIL	5.8.3, Table 5.5			M	M	In-Band PSIP
HstIBCS.145	The M-UDCP SHALL NOT be adversely affected by the presence or absence of the descriptor tag 0xA0 = Extended_channel_name_descriptor.	HPIL	5.8.3, Table 5.5			M	M	In-Band PSIP
HstIBCS.147	The M-UDCP SHALL support descriptor tag 0xA1 = service_location_descriptor().	HPIL	5.8.3, Table 5.5			M	M	In-Band PSIP
HstIBCS.149	The M-UDCP SHALL support descriptor tag 0xA2 = time_shifted_service_descriptor().	HPIL	5.8.3, Table 5.5			M	M	In-Band PSIP
HstIBCS.151	The M-UDCP SHALL support descriptor tag 0xA3 = component_name_descriptor().	HPIL	5.8.3, Table 5.5			M	M	In-Band PSIP
HstIBCS.153	The M-UDCP SHALL support descriptor tag 0xA4 = data_broadcast_descriptor().	HPIL	5.8.3, Table 5.5			M	M	In-Band PSIP
HstIBCS.155	The -UDCP SHALL support descriptor tag 0xA5 = PID_count_descriptor().	HPIL	5.8.3, Table 5.5			M	M	In-Band PSIP
HstIBCS.157	The M-UDCP SHALL support descriptor tag 0xA6 = download_descriptor().	HPIL	5.8.3, Table 5.5			M	M	In-Band PSIP
HstIBCS.159	The M-UDCP SHALL support descriptor tag 0xA7 = multi_protocol_encapsulation_descriptor()	HPIL	5.8.3, Table 5.5			M	M	In-Band PSIP
HstIBCS.175	The M-UDCP SHALL support 64 QAM with bit rate T64 = 26.97035 Mbps.	HPIL	9			M	M	Host Transport Stream Data Rate
HstIBCS.176	The M-UDCP SHALL support 256 QAM with bit rate T256 = 38.81070 Mbps..	HPIL	9			M	M	Host Transport Stream Data Rate

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
HstIBCS.177	The M-UDCP SHALL support symbol rate for 64 QAM S64 = 5.056941 Mbps	HPIL	9			M	M	Host Transport Stream Data Rate
HstIBCS.178	The M-UDCP SHALL support symbol rate for 256 QAM S256 = 5.360537 Mbps.	HPIL	9			M	M	Host Transport Stream Data Rate

3.1.6 OOB FDC Channel Support

FDCP.2	The M-UDCP SHALL support DRX (Receive Data) at rates 1.544/3.088Mbps and 2.048 Mbps.	HPIA	5.10 7.3.3.4			M	M	FDC Adjacent Channel BER
FDCP.3	The M-UDCP SHALL support CRX (Receive Gapped Clock) at rates 1.544, 3.088 and 2.048 MHz.	HPIA	5.10 7.3.3.4			M	M	FDC tuning range and bit rate
FDCP.6	The M-UDCP SHALL support signal voltage levels that are compatible with normal 3.3V CMOS levels.	HPIA	7.4.2.1			M	M	Host OOB Signaling Test
FDCP.11	The M-UDCP SHALL provide a set-up time (t_{SU}) of 10ns minimum. Measured from DRX valid at 1.5V to CRX rising at 1.5V.	HPIA	7.4.2.1			M	M	Host OOB Signaling
FDCP.12	The M-UDCP SHALL provide a hold time (t_H) of 5ns minimum. Measured from CRX rising 1.5V to DRX invalid at 1.5V.	HPIA	7.4.2.1			M	M	Host OOB Signaling
FDCP.14	The M-UDCP SHALL be able to navigate (tune) using the System information when it is carried in OOB-FDC, as described in [ANSI/SCTE 65] for the navigation function.	Appendix A	R-11			M	M	SCTE 65 Service Information Delivered OOB

3.1.7 Copy Protection Support

Overview								
CpsL.11	The M-UDCP SHALL comply with the copy protection requirements specified in [HPIN] for content marked with a non-zero EMI delivered in MPEG transport streams flowing from the Card to the M-UDCP.	HPIA	8			M	M	Copy Protection Support
Card and Host Mutual Authentication								
CpsR.11	The M-UDCP manufacturers SHALL assign the Host_ID as follows: 1) Set bits 39 through 30 to their CableLabs assigned manufacturer number. 2) Set the 30 least significant bits, bits numbered 29 to 0, to a unit number in the range of zero to 999,999,999 inclusive that is unique to the manufacturer number. Note: The Formatting of the Host certificate is generated by the Certificate Authority.	HPIN	5.1.2			M	M	Copy Protection Support

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
CpsR.12	The M-UDCP SHALL provide "Copy Protection" Resource with the Resource_identifier equal to 0x00B0010~~2~~3 type equal to 4 version equal to 3~~2~~.	HPIA	9.13 ECR 06-0939-3			M	M	Copy Protection Support
CpsR.13	The M-UDCP SHALL respond with its AuthKey, if available. If it is not available, then it SHALL respond with a value of zero.	HPIN	5.2			M	M	Copy Protection Support
CpsB.38	The M-UDCP SHALL generate a random private exponent, y, where 1 < y < n –2.	HPIN	5.3.2			M	M	Copy Protection Support
CpsB.16	The M-UDCP SHALL compute its DH public key as: $DH\_pubKey_H = g^y \bmod n$.	HPIN	5.3.2			M	M	Host Copy Protection CCI
CpsB.39	The M-UDCP SHALL derive $SIGN_H$ by signing DH_pubKey_H with its X.509 private key.	HPIN	5.3.2			M	M	Copy Protection Support
CpsB.10	The M-UDCP SHALL reply with its certificate data (Host_DevCert and Host_ManCert), DH_pubKey_H and $SIGN_H$.	HPIN	5.4			M	M	Copy Protection Support
CpsB.30	The M-UDCP SHALL verify Card_DevCert, Card_ManCert, and $SIGN_C$ and extract the Card_ID from the Card Device Certificate.	HPIN	5.4			M	M	Copy Protection Support
CpsB.33	The Card and M-UDCP SHALL each compute the DH shared secret key, DHKey, … as follows: The M-UDCP derives the 1024 bit shared key DHKey = (DH_pubKeyC)y mod n	HPIN	5.5.1			M	M	Host Copy Protection CCI, Copy Protection Support
CpsB.4a	The Card and M-UDCP SHALL store DHKey in non-volatile memory for CPKey generation and refresh.	HPIN	5.5.1			M	M	Copy Protection Support
CpsB.4b	The M-UDCP SHALL store AuthKeyH in non-volatile memory for CPKey generation and refresh.	HPIN	5.5.2			M	M	Copy Protection Support
CpsB.23	The M-UDCP SHALL calculate AuthKeyH using SHA-1 function with variables DHKeyH, Host_ID and Card_ID.	HPIN	5.5.2			M	M	Copy Protection Support
CpsB.34	The Card SHALL request and the M-UDCP SHALL provide AuthKeyH.	HPIN	5.5.3			M	M	Copy Protection Support
CpsB.27	In the event that the Card supplies an invalid certificate to the M-UDCP the M-UDCP SHALL display a message informing the user.	HPIN	5.6.2			M	M	Copy Protection Support
CpsB.36	The M-UDCP SHALL Display a message to the user similar to that shown in Figure 5.6-3 of HPIN.	HPIN	5.6.3			M	M	Copy Protection Support
CpsB.27a	When the M-UDCP / Card pairing information screen application info APDU is selected after the Card has provided an invalid certificate to the M-UDCP then the M-UDCP SHALL generate and display the following message: "Please call your cable operator and report an invalid CableCARD".	Appendix A	R-102			M	M	Copy Protection Support

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
CpsB.37	Following display at initial failure, the CP system failure notification message SHALL be displayed only if authentication has failed and 1) the message is selected through a user interface menu, or 2) the user tunes to a scrambled channel protected by the CA System.	HPIN	5.6.3			M	M	Copy Protection Support
ID Reporting, Validation, and Authorization								
CpsB.40	If the M-UDCP is in an off state or any non-video viewing state, it SHALL deny the MMI dialog open request.	HPIN	6.1.2			M	M	Host Application Information and MMI
CpsB.41	Once the M-UDCP is in a video viewing state, it SHALL grant the open MMI dialog request.	HPIN	6.1.2			M	M	Host Application Information and MMI
CpsB.42	The M-UDCP SHALL display the message and confirm to the Card that the message has been displayed to the operator.	HPIN	6.1.2			M	M	Copy Protection Support
CpsB.28	The ID Reporting Screen SHALL be displayed only if: the message is selected through a user menu system, the user selects an MPEG program with CP active (non-zero EMI) before the binding is validated, or the Card initiates the message display, e.g., at the request of the CA System. Note: Additional Card data may be displayed, at the discretion of the CableCARD and CA system vendor.	HPIN				M	M	Copy Protection Support
Cryptographic Functions								
CpsB.43	The Card and M-UDCP SHALL each implement a physical or a pseudorandom (software) integer generator	HPIN	7.2			M	M	Copy Protection Support
CpsL.7	Pseudorandom generators SHALL be compliant with the SHA-1 based algorithm described in [FIPS 186-2], Appendix 3, Section 3.3, and include a unit-unique secret seed.	HPIN	7.2			M	M	Copy Protection Support
CpsB.44	Physical random integer generators SHALL comply with [FIPS 140-2], Section 4.7.1 test for randomness.	HPIN	7.2			M	M	Copy Protection Support
CpsL.6	RSA digital signatures SHALL be computed using RSASSA-PKCS1-v1_5 as specified in [RSA1] with SHA-1 as the hash function.	HPIN	7.5			M	M	Copy Protection Support
CpsB.45	RSA keys used to sign the Device Certificates and Manufacturer Certificates SHALL have modulus length of 2048 bits.	HPIN	7.5			M	M	Copy Protection Support
CpsK.7	The Card and M-UDCP SHALL perform the following procedure to generate the CPKey: 1) The Host generates its 64 bits random integer (N_Host). 2) The Host sends N_Host and its Host_ID in the clear to the Card.	HPIN	8.1			M	M	Copy Protection Support

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
CpsK.14	Each CPKey refresh SHALL recalculate the content key using a new pair of nonces (N_Host, N_Card) exchanged between the Card and Host.	HPIN	8.3			M	M	Copy Protection Support
CpsK.11	The M-UDCP SHALL reply with a CP_data_cnf() message within one second of receiving a CP_data_req() message.	HPIN	8.3			M	M	Copy Protection Support
CpsK.15	When the M-UDCP issues the CP_data_cnf(), the Card and M-UDCP SHALL start the calculation of the Copy Protection Key.	HPIN	8.3.2			M	M	Copy Protection Support
CpsK.18	The M-UDCP SHALL issue the CP_sync_cnf() message when it has received the CP_sync_req() message and has completed calculation of the Host CPKey when operating in S-Mode, and CPKeyA and CPKeyB and the resulting DES_keys when operating in M-Mode.	HPIN	8.3.2			M	M	Copy Protection Support
Cryptographic Functions (M-Mode)								
CpsK.12	For M-Mode, the Card and the M-UDCP in M-Mode SHALL apply the DFAST function to Ks to produce two Copy Protection Keys CPKeyA and CPKeyB: CPKeyA= DFAST [KsA] and CPKeyB= DFAST [KsB].	HPIN	8.2			M	M	Copy Protection Support
CpsK.13	When a CPKey refresh occurs, both CPKeyA and CPKeyB SHALL be refreshed by the M-UDCP.	HPIN	8.3			M	M	Copy Protection Support
CpsK.17	The Card in M-Mode and M-UDCP in M-Mode SHALL each calculate CPKeyA and CPKeyB within 28 seconds when operating in M-Mode.	HPIN	8.3.2			M	M	Copy Protection Support
Copy Control Information (CCI)								
CpsC.23	The M-UDCP SHALL apply content protection on analog and digital sources to set copy control parameters on Host outputs of content CA-descrambled by the Card.	HPIN	9			M	M	Host Copy Protection and CCI Host Macrovision Test
CpsC.4a	The M-UDCP SHALL retain the temporal association of CCI with content to within two seconds. Note: The Temporal association conditions are identified in CPsC.4b.	HPIN	9.4.3			M	M	Vendor Documentation Indicating Compliance
CpsC.4b	The M-UDCP SHALL control output of content according to the originally associated CCI value, independent of any other action of the M-UDCP, including but not limited to: a) recording and delayed playback or output of content, b) M-UDCP "power-off" while the Card remains powered, or c) M-UDCP tuning away to analog or clear digital channels and then back to content with non-zero CCI	HPIN	9.4.3			M	M	Vendor Documentation Indicating Compliance
CpsC.32	The M-UDCP SHALL maintain associated CCI value from unauthorized modification, substitution, and loss of temporal association on internal interfaces.	HPIN	9.4.3			M	M	Vendor Documentation Indicating Compliance

	Feature	Spec	Ref	Support	Pass/Fail			ATP Test Name
						UHMT	UHMS	
CpsC.24	The M-UDCP SHALL use the reserved [CCI] bit values received from the Card only for execution of the protocol described in section 9.1 of HPIN and SHALL ignore the reserved [CCI] bit values thereafter.	HPIN	9.1			M	M	Copy Protection Support
CpsC.27	The two lsb of the CCI byte are the EMI bits. They SHALL control copy permissions for digital copies.	HPIN	9.1.1			M	M	Copy Protection Support
CpsC.1	The EMI bits SHALL be supplied to any M-UDCP digital output ports for control of copies made from those outputs.	HPIN	9.1.1			M	M	Copy Protection Support
CpsC.15	The M-UDCP SHALL use the APS bits to control copy protection encoding of analog outputs as described in Table 9.1-3 and detailed in section 9.1.2 of HPIN.	HPIN	9.1.2			M	M	Host Macrovision
CpsC.21	The M-UDCP SHALL control Image Constraint of high definition analog component outputs according to the value of CIT as shown in Table 9.1-4 of HPIN.	HPIN	9.1.3			M	M	Copy Protection Support
CpsC.9	The M-UDCP SHALL generate a new random integer CCI_N_Host for each CCI transfer.	HPIN	9.4.2			M	M	Copy Protection Support
CpsC.30	The M-UDCP SHALL reply with: For M-Mode: CCI_N_Host, program_number and LTSID with the received value defined in 9.4.2, step 2 of HPIN.	HPIN	9.4.2			M	M	Copy Protection Support
CpsC.12a	The M-UDCP SHALL calculate CCI_auth using the received CCI value and compare it with the CCI_auth value received from the Card.	HPIN	9.4.2			M	M	Copy Protection Support
CpsC.12b	If the compared CCI_auth value does not match, the M-UDCP SHALL set the Host CCI=0x03, set and return a zero value CCI_ack to the Card to indicate the failure.	HPIN	9.4.2			M	M	Vendor Documentation Indicating Compliance
CpsC.31	The M-UDCP SHALL control output of the associated MPEG program according to valid CCI within one second.	HPIN	9.4.2			M	M	Vendor Documentation Indicating Compliance
Transport Encryption from Card to Host								
CpsT.5	For M-Mode, ABA Triple DES ECB SHALL be used to scramble copy protected MPEG programs in the Card and to descramble them in the M-UDCP in M-Mode. Any residual blocks SHALL be handled as defined in [HPIN] Annex B.	HPIN	10.3			M	M	Copy Protection Support
CpsT.6	Each instance of the DESKeym SHALL be immediately available for use by the DES-ECB cryptographic elements in the Card in M-Mode and M-UDCP in M-Mode upon transmission of the CP_sync_cnf() APDU that follows a CPKey generation or refresh.	HPIN	10.5.2			M	M	Copy Protection Support
Card-Host Messaging Protocols								
CpsM.1	Certificates shorter than 2048 SHALL be padded to 2048 bytes by adding NULL bytes (0x00) at the trailing end. For example a 2000 byte certificate would be padded to 2048 bytes by adding 48 trailing NULL bytes	HPIN	11.2			M	M	Copy Protection Support
CpsM.10	The M-UDCP SHALL provide the Copy Protection System with CP_system_id = 2.	HPIN	11.2			M	M	Copy Protection Support

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
CpsM.11	The M-UDCP MAY use CP_valid_req() APDU to request the Card Validation status. The Card Validation status is set as indicated in Table 11.8-4 of HPIN.	HPIN	11.8			O	O	Copy Protection Support
CpsM.2	The M-UDCP responds with a session status. If opened, a session number is assigned. The session number SHALL then be used for all subsequent exchanges of messages (APDUs) between Card and M-UDCP.	HPIN	11.3			M	M	Copy Protection Support
CpsM.3	The resource_identifier SHALL match in both class and type of resource that the M-UDCP has in its list of available resources.	HPIN	11.3			M	M	Copy Protection Support
CpsM.4	When the version field of the supplied resource identifier is zero, then the M-UDCP SHALL use the current version in its list.	HPIN	11.3			M	M	Vendor Documentation Indicating Compliance
CpsM.5	When the requested version number is higher than the version in the M-UDCP's list, the M-UDCP SHALL refuse the request with the appropriate return code as defined in HPIA.	HPIN	11.3			M	M	Vendor Documentation Indicating Compliance
CpsM.6	The M-UDCP SHALL use CP_open_cnf() APDU in response to the CP_open_req() APDU received from the Card.	HPIN	11.3.1			M	M	Copy Protection Support
CpsM.7	Upon receipt of this CP_open_req() APDU, the M-UDCP SHALL generate N_Host and send it to the Card along with the Host_ID.	HPIN	11.5			M	M	Copy Protection Support
CpsM.8	Status_field [in the Host's CPKey Ready Message] SHALL return the status of the CP_sync_req() APDU.	HPIN	11.6			M	M	Copy Protection Support
CpsM.9	When the M-UDCP is ready to receive the incoming stream, then Status_field SHALL be set to 0x00. Otherwise, it SHALL be set as indicated in Table 11.6-4 of HPIN.	HPIN	11.6			M	M	Copy Protection Support
	Applying CPKey to DES Engine							
CpsD.1	Pi SHALL be either 0 or 1 so that each octet has odd parity (i.e. there is an odd number of "1" bits).	HPIN	B.1			M	M	Copy Protection Support
CpsD.2	The Transport Stream packet header, and adaptation field when present, SHALL not be scrambled.	HPIN	B.3.2			M	M	Copy Protection Support

3.1.8 Certificate Management

CertMgt.1	The M-UDCP SHALL validate the X.509 version 3 Card device certificate as defined in Table A-3.	Appendix A	R-300			M	M	Copy Protection Support
CertMgt.25	The M-UDCP signature mechanism SHALL use SHA-1 with RSA Encryption with specific OID 1.2.840.113549.1.1.5	Appendix A	R-301			M	M	Copy Protection Support
CertMgt.2	The M-UDCP SHALL have a Root CA Certificate as defined in Table A-1.	Appendix A	R-302			M	M	Copy Protection Support
CertMgt.3	The M-UDCP SHALL have a Manufacturer CA Certificate as defined in Table A-2.	Appendix A	R-303			M	M	Copy Protection Support

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
CertMgt.3a	The M-UDCP SHALL validate the keyUsage extension with the keyCertSign and cRLSign bits asserted, and have the critical and mandatory flags set in the Card Manufacturer CA Certificate as received from the Card.	Appendix A	R-304			M	M	Copy Protection Support
CertMgt.3b	The M-UDCP SHALL validate the subjectKeyIdentifier extension composed of a keyIdentifier value which SHALL be the 160-bit SHA-1 hash of the value of the BIT STRING subjectPublicKey (excluding the tag, length, and number of unused bits from the ASN1 encoding) and have the non-critical and mandatory flags set in the Card Manufacturer CA Certificate as received from the Card.	Appendix A	R-305			M	M	Copy Protection Support
CertMgt.3c	The M-UDCP SHALL validate the authorityKeyIdentifier extension in the Card Device certificate which SHALL include a keyIdentifier value that is identical to the subjectKeyIdentifier in the Card Manufacturer CA certificate and have the non-critical and mandatory flags set in the Card Device Certificate as received from the Card and The M-UDCP SHALL validate that the non-critical and mandatory flags are set in the authorityKeyIdentifier extension of the Card Manufacturer CA Certificate as received from the Card.	Appendix A	R-306			M	M	Copy Protection Support
CertMgt.3d	The M-UDCP SHALL validate the basicConstraints extension using the parameters cA true and pathLenConstraint = 0 and have the critical and mandatory flags set in the Card Manufacturer CA Certificate as received from the Card.	Appendix A	R-307			M	M	Copy Protection Support
CertMgt.4	The M-UDCP SHALL have a Host Device Certificate as defined in Table A-3.	Appendix A	R-308			M	M	Copy Protection Support
CertMgt.4a	The M-UDCP SHALL validate that the keyUsage extension in the Card device Certificate extension is present and that the extension’s digitalSignature and keyEncipherment parameter’s are set to 1.	Appendix A	R-309			M	M	Copy Protection Support
CertMgt.4b	The M-UDCP SHALL validate that the authorityKeyIdentifier extension in the Card Device Certificate is present and the extension’s keyIdentifier value is identical to the Device CA Certificate’s subjectKeyIdentifier.	Appendix A	R-310			M	M	Copy Protection Support

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
CertMgt.8	The M-UDCP Manufacturer CA Certificate SHALL be verified as part of a certificate chain containing the CableLabs Manufacturer Root CA Certificate and the Manufacturer CA Certificate. Note: Verify the CableLabs root certificate is the issuer in the manufacturer root certificate. Note: The Chaining of the Host certificate is generated by the Certificate Authority.	Appendix A	R-360			M	M	Vendor Documentation Indicating Compliance
CertMgt.10	The M-UDCP Host_ID MUST be expressed as hexadecimal digits. The Alpha HEX characters (A-F) MUST be expressed as uppercase letters.	Appendix A	R-311			M	M	Copy Protection Support
CertMgt.11	The M-UDCP Host_ID defined in the CN field of the X.509 Host Device certificate SHALL comply with the following requirements: • CableLabs shall assign a 3 decimal digit Host manufacturer number upon request by any DFAST signatory who has successfully completed Host certification, • The 10 most significant bits of the Host ID SHALL be set equal to the binary equivalent of the Host manufacturer number. • Host manufacturers shall set the remaining 30-bits of the Host_ID to a value between zero and 999,999,999 decimal, 3B9AC9FF hexadecimal, to facilitate on-screen presentation to subscribers and manual report back. • The Host_ID (40-bits) assigned to each Host device certificate MUST be unique to each Host device.	Appendix A	R-312			M	M	Copy Protection Support
CertMgt.12	The M-UDCP validation SHALL comply with the certificate validation requirements in RFC 3280, where they are referred to as “Certificate Path Validation”, except the M-UDCP SHALL NOT implement the certificate revocation check described in section 6.1.3 (a) (3) of RFC 3280. The revocation check cannot be performed, so it is omitted during the certificate path validation process. The certificate revocation check will be performed as part of the Authentication Phase 2 described in the [HPIN]. Note: This PICS is for verification of the M-UDCP ability to perform certificate chain validation of the Card.	Appendix A	R-313			M	M	Copy Protection Support
CertMgt.13	The M-UDCP DER-encoded tbsCertificate.issuer field of a certificate SHALL be an exact match to the DER-encoded tbsCertificate.subject field of its issuer Certificate.	Appendix A RCF 3280	R-363			M	M	Copy Protection Support
CertMgt.16	The M-UDCP SHALL validate that the period of the Card's device certificate SHALL begin with the Card's date of manufacture and extend to not greater than 30 years after the Card's date of manufacture.	Appendix A	R-315			M	M	Copy Protection Support

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
CertMgt.21a	The M-UDCP SHALL NOT reject as invalid a Card's Certificates solely on the basis of missing optional fields.	Appendix A	R-346			M	M	Copy Protection Support
CertMgt.26	M-UDCP's SHALL be designed and manufactured in a manner to effectively frustrate attempts to discover or reveal (i) the unique number, of a specified bit length, assigned to each Multi-stream Unidirectional Digital Cable Product, the numbers used in the process for encryption or decryption of Controlled Content, or the private key used in the process for encryption or decryption of Controlled Content (collectively, "**Keys**") and (ii) the methods and cryptographic algorithms used to generate such Keys. For the avoidance of doubt, Keys includes the private key used for authentication. All authentication private keys shall be protected using encryption or obfuscation methods when being transferred across internal buses and stored in memory.	Appendix A	R-317			M	M	Copy Protection Support
CertMgt.28	The M-UDCP shall set the remaining 30-bits of the Host_ID to a value between zero and 999,999,999 decimal, 11,1011,1001,1010,1100,1001,1111,1111 binary, 3B9AC9FF hexadecimal, to facilitate on-screen presentation to subscribers and manual report back.	Appendix A	R-365			M	M	Copy Protection Support

3.2 Network Interface

3.2.1 FAT Channels

3.2.1.1 Digital Video

HNETdig_vid.2	The M-UDCP SHALL support all video compression formats listed in Table 3 of [SCTE43] and reproduced as Table X below.	NIU	Table 3			M	M	Digital Video Compression
HNETdig_vid.3	The M-UDCP SHALL support Sequence Header Constraints vertical_size_ according to Table X below.	NIF	2.4.2.3			M	M	Digital Video Compression
HNETdig_vid.4	The M-UDCP SHALL support Sequence Header Constraints aspect_ratio_ according to Table X below.	NIU	5.1.1,5.1.2			M	M	Digital Video Compression
HNETdig_vid.5	The M-UDCP SHALL support Sequence Header Constraints frame_rate_code according to table X below.	NIU	5.1.1,5.1.2			M	M	Digital Video Compression
HNETdig_vid.6	The M-UDCP SHALL support Sequence Header Constraints bit_rate_value <= 0x107AC (for 64 QAM)	NIU	5.1.1			M	M	Digital Video Compression
HNETdig_vid.7	The M-UDCP SHALL support Sequence Header Constraints bit_rate_value <= 0x17AE8 (for 256 QAM).	NIU	5.1.1			M	M	Digital Video Compression,
HNETdig_vid.8	The M-UDCP SHALL support Sequence Header Constraints vbv_buffer_size_value <= 0x1E8.	NIU	5.1.1			M	M	Digital Video Compression
HNETdig_vid.10	The M-UDCP SHALL support Sequence Extension Constraints profile_and_level_indication = 0x48.	NIU	5.1.3			M	M	Digital Video Compression

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
HNETdig_vid.11	The M-UDCP SHALL support Sequence Extension Constraints profile_and_level_indication = 0x44.	NIU	5.1.3			M	M	Digital Video Compression
HNETdig_vid.12	The M-UDCP SHALL support Sequence Extension Constraints chroma_format = ‘01’.	NIU	5.1.3			M	M	Digital Video Compression
HNETdig_vid.13	The M-UDCP SHALL support Sequence Extension Constraints horizontal_size_extension = ‘00’.	NIU	5.1.3			M	M	Digital Video Compression
HNETdig_vid.14	The M-UDCP SHALL support Sequence Extension Constraints vertical_size_extension = ‘00’.	NIU	5.1.3			M	M	Digital Video Compression
HNETdig_vid.15	The M-UDCP SHALL support Sequence Extension Constraints bit_rate_extension = 0x000.	NIU	5.1.3			M	M	Digital Video Compression
HNETdig_vid.16	The M-UDCP SHALL support Sequence Extension Constraints vbv_buffer_size_extension = 0x00.	NIU	5.1.3			M	M	Digital Video Compression
HNETdig_vid.17	The M-UDCP SHALL support Sequence Extension Constraints frame_rate_extension_n = ‘00’.	NIU	5.1.3			M	M	Digital Video Compression
HNETdig_vid.18	The M-UDCP SHALL support Sequence Extension Constraints frame_rate_extension_d = ‘0000 0’.	NIU	5.1.3			M	M	Digital Video Compression
HNETdig_vid.19	The M-UDCP SHALL support Picture Header Constraints vbv_delay = 0xFFFF or 0xAFC8.	NIU	5.1.5			M	M	Digital Video Compression
HNETdig_vid.20	The M-UDCP SHALL support Picture Coding Constraints when progressive_frame = 1 when frame_pred_frame is set to one.	NIU	5.1.6			M	M	Digital Video Compression
HNETdig_vid.22	The M-UDCP SHALL use an MPEG-2 decoder that is capable of decoding video streams with the low_delay flag enabled.	NIF	2.4.2.3			M	M	Audio Parametric/ Digital Audio Functionality.
HDST.11	The UHMT SHALL decode MPEG-2 video with resolutions shown in Table 3 of [ANSI/SCTE 43] with the following condition: The resolution of the displayed image SHALL be at the option of the UHMT manufacturer.	SCTE 43	5.1.2			M	N/A	Digital Video Compression
HDST.20	If analog component video outputs are present on the M-UDCP the MPEG sequence display extension SHALL be observed when present in the transport stream to determine when color matrix conversion is necessary. For any standard definition MPEG format listed in Table 3 of [ANSI/SCTE 43] that does not include the sequence display extension, the colorimetry will be converted from SMPTE-170M to ITU-R-BT.709 in the M-UDCP. User selectable colorimetry conversion MAY be available to override default settings.	Appendix A	R-366			M	M	Digital Video Compression
HDST.21	The scanning systems supported on the DVI or HDMI output SHALL include at least one of the recommended formats of all those identified for a source device in EIA/CEA-861B.	HD2	Table 5 Table 6			C-M	C-M	Uncompressed Digital Video Interface

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
HDST.22	The DVI or HDMI input of M-UDCP SHALL support the mandatory parts of [CEA-861-B] for a sink device. Other formats listed in [CEA-861-B] as optional MAY also be supported.	HD2	Table 5 Table 6			C-M	N/A	Uncompressed Digital Video Interface
HDST.23	Each of the MPEG formats described in Table 3 of SCTE 43 SHALL be converted to the preferred format and aspect ratio of the display device connected to the DVI or HDMI output, as discovered via the Enhanced Extended Display Identification Data (E-EDID) Detailed Timing Descriptions or the CEA Timing Extensions structures communicated from the display to the host via the DVI or HDMI interface, and as constrained by EIA/CEA-861B [CEA861B].	HD2	Table 5 Table 6			C-M	C-M	Uncompressed Digital Video Interface
HDST.24	In the event that the E-EDID data structure or CEA EDID timing extension does not contain a supported timing format or cannot be read, then the DVI or HDMI output SHALL use 640x480p mode, if available. If 640x480p mode is not supported by the M-UDCP then 720x480p mode MAY be utilized, if available. If neither mode is available, then the DVI or HDMI output SHALL be disabled.	HD2	Table 5 Table 6			C-M	C-M	Uncompressed Digital Video Interface
HDST.25	The DVI or HDMI interface in compliance with this specification SHALL employ the RGB component format according to Section 5 of EIA/CEA-861B.	HD2	Table 5 Table 6			C-M	C-M	Uncompressed Digital Video Interface
HSTCCP.7	The M-UDCP MPEG-2 decoder SHALL support error concealment to minimize macroblock and stream synchronization errors.	Appendix A	R-367			M	M	Digital Video Compression
HDST.5	The M-UDCP MPEG-2 decoder SHALL support decoding of a MPEG-2 Main Profile @ High Level Single Program Transport Stream encoded at a constant bit rate (CBR) of 38.81070Mbps or variable bit rate (VBR), with peak rates up to 38.81070Mbps, the maximum payload rate for a 256QAM channel.	Appendix A	R-368			M	M	MPEG-2 Maximum Rate Single Transport Stream

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name

Table X Compression Format Constraints

vertical_size_ value	horizontal_size_ value	aspect_ratio_ information	frame_rate_ code	progressive_ sequence
1080	1920	1, 3	1, 2, 4, 5	1
1080	1920	1, 3	4, 5	0
1080	1440	3	1, 2, 4, 5	1
1080	1440	3	4, 5	0
720	1280	1, 3	1, 2, 4, 5, 7, 8	1
480	720	2, 3	1, 2, 4, 5, 7, 8	1
480	720	2, 3	4, 5	0
480	704	2, 3	1, 2, 4, 5, 7, 8	1
480	704	2, 3	4, 5	0
480	640	1, 2	1, 2, 4, 5, 7, 8	1
480	640	1, 2	4, 5	0
480	544	2	1	1
480	544	2	4	0
480	528	2	1	1
480	528	2	4	0
480	352	2	1	1
480	352	2	4	0

Legend for MPEG-2 coded values in Table X
aspect_ratio_information 1 = square samples 2 = 4:3 display aspect ratio 3 = 16:9 display aspect ratio
frame_rate_code 1 = 23.976 Hz 2 = 24 Hz 4 = 29.97 Hz 5 = 30 Hz 7 = 59.94 Hz 8 = 60 Hz
progressive_sequence 0 = interlaced scan 1 = progressive scan

* The values for the variables shown in the table above will be converted to hex or binary for verification.

3.2.1.2 Digital Audio

HNETdig_aud.1	The M-UDCP SHALL process Audio stream_type = 0x81 as defined in ATSC A/52 and constrained in ATSC A/53.	HPIL	5.8.2.2, 5.8.3, 5.8.3.1			M	M	In-Band PSIP
HNETdig_aud.2	The M-UDCP SHALL use the ISO_639_language_descriptor, when present, as defined in [ISO/IEC 13818-1] and constrained by [ANSI/SCTE 54], to identify the language associated with audio tracks and to allow access to each available Complete Main audio stream of stream type 0x81 in a given service.	HD	Annex B Section 6			M	M	In-Band PSIP Audio Parametric/ Digital Audio Functionality
HNETdig_aud.5	The M-UDCP with audio decoding capabilities SHALL support the frequency code fscod = ‘00’ (which is the sampling rate of 48 kHz).	NIT; HD	5.4.1.3; Annex B 5.1, 5.2			M	M	Audio Parametric/ Digital Audio Functionality

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
HNETdig_aud.6	The M-UDCP SHALL accept the audio constraints called out in table B1 of reference HD: Any main audio service or associated audio service containing all necessary program elements will have the frmsizecod element less than or equal to '011110', indicating 448 kbps.	HD	Table B1			M	M	Audio Parametric/ Digital Audio Functionality
HNETdig_aud.11	The M-UDCP SHALL not be adversely affected by any audio service type (bsmod) defined in HD Annex B Table B2.	HD; Appendix A	Annex B 6.2 R-33			M	M	Audio Parametric/ Digital Audio Functionality
Audio.15	The M-UDCP SHALL be certified by Dolby Laboratories, Inc. for Dolby Digital™ decoding.	Appendix A	R-375			M	M	Audio Parametric/ Digital Audio Functionality.
HstIBCS.30	The M-UDCP SHALL support the value of stream_id for AC-3 audio of 1011 1101 (private_stream_1).	HPIL	5.6.1			M	M	Audio Parametric/ Digital Audio Functionality.
HstIBCS.182	The M-UDCP SHALL accept Packetized Elementary Stream syntax and semantics format used to encapsulate the audio and video elementary stream information according to ISO/IEC 13818-1.	HPIL	5.6			M	M	Audio Parametric/ Digital Audio Functionality.
HNETdig_aud.4	The M-UDCP SHALL recognize the synchronization word as syncword = 0x0B77	NIT	5.4.1.1			M	M	Audio Parametric/ Digital Audio Functionality.
HNETdig_aud.7	The M-UDCP SHALL support the AC3 audio with a bsid = '01000'.	NIT	5.4.2.1			M	M	Audio Parametric/ Digital Audio Functionality.
HNETdig_aud.8	The M-UDCP SHALL not be adversely affected by any audio service type (bsmod) defined in HD Annex B Table B2.	HD	Annex B 6.2 R-33			M	M	Audio Parametric/ Digital Audio Functionality.
HNETdig_aud.9	The M-UDCP SHALL support the AC3 audio with acmod = as defined in Table 5.8 of NIT.	NIT	5.4.2.3; Table 5.8			M	M	Audio Parametric/ Digital Audio Functionality.
HNETdig_aud.12	The M-UDCP SHALL accept the audio constraints called out in table B-1 of reference HD: The combined rate of a main and an associated service intended to be simultaneously decoded SHALL be less than or equal to 512 kbps.	HD	Annex B 5.1			M	M	Audio Parametric/ Digital Audio Functionality.

3.2.1.4 EAS

HNIEAS.1	The M-UDCP SHALL process EAS messages, when received, as defined in [SCTE 18].	NIA	8.7			M	M	In-Band EAS
HNIEAS.2	When the M-UDCP is connected to a Card the M-UDCP SHALL process EAS in the out-of-Band according to sections 5, 6 and 7 of NIQ.	NIQ	5, 6, 7			M	M	In-Band EAS OOB EAS Test
HNIEAS.3	Any cable_emergency_alert() message received in_Band SHALL be discarded if the M-UDCP has current access to an out-of-Band channel.	NIQ	7.1 #2			M	M	In-Band EAS

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
HNIEAS.4	In case there is an overlapping message, whenever a new EAS event is seen at the M-UDCP the M-UDCP SHALL immediately end processing any prior event that might still be in progress and begin processing the new event.	NIQ	7.2 #15			M	M	In-Band EAS
HNIEAS.5	In case the network sends multiples copies of a cable_emergency_alert() message, the M-UDCP SHALL discard duplicates based on sequence_number checking.	NIQ	7.1 #4			M	M	In-Band EAS
HNIEAS.6	The M-UDCP SHALL tune to the details channel identified by details_OOB_source_ID if audio override is required.	NIQ	7.6 # 31 8.4			M	M	In-Band EAS OOB EAS Test
HNIEAS.7	For EAS event that passes filtering and priority processing where the alert_message_time_remaining is non-zero, the M-UDCP SHALL stay on the details channel for a period of time given by alert_message_time_remaining. At the end point of the message the M-UDCP SHALL reacquire the service that was active when the EAS event occurred.	NIQ	7.6 #32			M	M	In-Band EAS
HNIEAS.8	When the alert_message_time_remaining value is set to zero (indefinite) the M-UDCP SHALL not return to original service unless it is initiated by the user or another cable_emergency alert message is received that meets the conditions of Sec. 5.2 (Overlapping Events) and that message results in completion of the alert processing.	NIQ	7.6 # 33			M	M	In-Band EAS
HNIEAS.9	When the M-UDCP is operating without a Card module in place, it SHALL process inband EAS messages as described in Sections 5 and 7 of NIQ.	NIQ; Appendix A	5, 7; R-318			M	M	In-Band EAS
Miscellaneous processing								
HNIEAS.10	When monitoring PID 0x1FFB in-band or PID 0x1FFC out-of-band the M-UDCP SHALL recognize an MPEG table section with table ID 0xD8, as a cable_emergency_alert() message.	NIQ; Appendix A	5, 7.1 #1; R-319			M	M	OOB EAS Test
HNIEAS.11	The M-UDCP SHALL silently discard* any cable_emergency_alert() message in which the value of the protocol_version field is non-zero. Note: 'Silently Discard' means 'display nothing, take no action and not be adversely affected by'.	NIQ; Appendix A	5 7.1 #8; R-320			M	M	OOB EAS Test
HNIEAS.12	When an out-of-band channel is available, the M-UDCP SHALL silently discard* any cable_emergency_alert() message received via the in-band (FAT) channel. Note 'Silently Discard' means 'display nothing, take no action and not be adversely affected by'.	NIQ; Appendix A	7.1 #2; R-321			M	M	OOB EAS Test
HNIEAS.13	While not in "Standby mode", and when an out-of-band channel is available, the M-UDCP SHALL keep open and monitor an Extended Channel flow of type MPEG_section on PID 0x1FFC to watch for cable_emergency_alert() message events.	NIQ; Appendix A	5 7.1 #2; R-322			M	M	OOB EAS Test

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
HNIEAS.14	While not in “Standby mode”, and when no out-of-band channel is available, the M-UDCP SHALL monitor PID 0x1FFB in-band to watch for cable_emergency_alert() message events.	NIQ; Appendix A	5 7.1 #3; R-323			M	M	In-Band EAS
Duplicate detection processing								
HNIEAS.15	For purposes of duplicate detection, the M-UDCP SHALL record the most recently received sequence_number value in each cable_emergency_alert() messages received, even those that are ultimately discarded.	NIQ; Appendix A	5; R-324			M	M	In-Band EAS
HNIEAS.16	The M-UDCP SHALL process the sequence_number in cable_emergency_alert() message in order to detect and discard duplicate transmissions. A cable_emergency_alert() message SHALL be discarded if the sequence_number matches the most recently received cable_emergency_alert() message.	NIQ; Appendix A	5 7.1 #4; R-325			M	M	In-Band EAS
HNIEAS.17	Just following initial application of main power to the unit and prior to completion of Card initialization (if a Card is present), the sequence_number SHALL be considered to be unknown. Therefore, in that state, the M-UDCP SHALL not discard a cable_emergency_alert() message based on its sequence_number.	NIQ; Appendix A	5 7.1 #5; R-326			M	M	In-Band EAS
HNIEAS.18	When no out-of-band channel is available, upon tuning to a new RF carrier, the sequence_number SHALL be considered to be unknown. Therefore, in that state, the M-UDCP SHALL not discard a cable_emergency_alert() message based on its sequence_number.	NIQ; Appendix A	5 7.1 #7; R-327			M	M	In-Band EAS
HNIEAS.19	Just following establishment of communication on the out-of-band channel (e.g., just after Card initialization and/or application of main power to the unit), the sequence_number SHALL be considered to be unknown. Therefore, in that state, the M-UDCP SHALL not discard a cable_emergency_alert() message based on its sequence_number.	NIQ; Appendix A	5 7.1 #6; R-328			M	M	OOB EAS Test
HNIEAS.19a	Just following loss of communication on the out-of-band channel (e.g., just after Card removal), the sequence_number SHALL be considered to be unknown. Therefore, in that state, the M-UDCP SHALL not discard a cable_emergency_alert() message based on its sequence_number.	NIQ; Appendix A	5 7.1 #7; R-329			M	M	In-Band EAS
Exception list processing								
HNIEAS.20	When no out-of-band channel is available, the M-UDCP SHALL discard any cable_emergency_alert() message in which the currently tuned channel matches any exception_major_channel_number and exception_minor_ channel_number pair found in the exception list in the message.	NIQ; Appendix A	5 7.4 #25; R-330			M	M	In-Band EAS

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
HNIEAS.21	When an out-of-band channel is available, the M-UDCP SHALL discard any cable_emergency_alert() message in which the currently tuned source_ID in the currently-tuned channel matches any exception_OOB _source_ID listed in the message.	NIQ; Appendix A	5 7.4 #24; R-331			M	M	OOB EAS Test
Alert priority processing								
HNIEAS.22	The M-UDCP SHALL discard any cable_emergency_alert() message with an alert_priority field value of 0.	NIQ; Appendix A	5 7.5 #30; R-332			M	M	In-Band EAS OOB EAS Test
HNIEAS.23	The M-UDCP SHALL process and respond to a cable_emergency_alert() message that passes duplicate detection and exception processing tests if the alert_priority is any value in the range 1 to 3 and the currently acquired service is unscrambled. The M-UDCP SHALL respond by scrolling alert_text() over video. Audio SHALL NOT be affected.	NIQ; Appendix A	5 7.5 #29; R-333			M	M	In-Band EAS
HNIEAS.24	The M-UDCP SHALL process and respond to a cable_emergency_alert() message that passes duplicate detection and exception processing tests if the alert_priority is any value in the range 4 to 7. The M-UDCP SHALL respond by scrolling alert_text() over video. Audio SHALL NOT be affected.	NIQ; Appendix A	5 7.5 #28; R-334			M	M	In-Band EAS
HNIEAS.40	The M-UDCP SHALL process and respond to a cable_emergency_alert() message that passes duplicate detection and exception processing tests if the alert_priority is any value in the range 8 to 11. The M-UDCP SHALL respond by scrolling alert_text() over video, or output of alert-related video.	NIQ	5 7.5 #27			M	M	OOB EAS Test
HNIEAS.25	The M-UDCP SHALL process and respond to a cable_emergency_alert() message that passes duplicate detection and exception processing tests if the alert_priority is any value in the range 12 to 15. Response to the alert SHALL involve tuning to (or staying tuned to) the Details channel.	NIQ; Appendix A	5 7.5 #26; R-335			M	M	In-Band EAS
alert_message_time_remaining processing								
HNIEAS.26	When processing of a cable_emergency_alert() message involves tuning to the Details channel and the alert_message_time_remaining field is non-zero, the M-UDCP SHALL remain on the Details channel, for the number of seconds indicated in alert_message_time_remaining (unless processing a new alert extends the time before returning to the channel that was interrupted by the alert).	NIQ; Appendix A	7.6 #32; R-336			M	M	In-Band EAS

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
HNIEAS.27	When processing of a cable_emergency_alert() message involves tuning to the Details channel and the alert_message_time_remaining field is zero, the M-UDCP SHALL remain on the Details channel until the viewer manually changes channels or until processing of a new cable_emergency_alert() message results in a return to the channel that was originally interrupted or in tuning to a new Details channel.	NIQ; Appendix A	5 7.6 #33; R-337			M	M	In-Band EAS
Alert text display								
HNIEAS.28	When display of alert_text() is required ("Scroll alert_text() over video" in Figure 1), the M-UDCP SHALL scroll the text slowly across the top of the video screen, from right to left, over video.	NIQ; Appendix A	5 7.7 #34; R-338			M	M	In-Band EAS
HNIEAS.29	When display of alert_text() is required ("Scroll alert_text() over video" in Figure 1 of NIQ), if the entire text message display cannot be completed within the time given by alert_message_time_remaining, the M-UDCP SHALL continue the text display until it is complete.	NIQ; Appendix A	5 7.7 #35; R-339			M	M	In-Band EAS
HNIEAS.30	The M-UDCP SHALL process multi-lingual alert_text(), and SHALL choose at most one language for display when text is provided multi-lingually.	NIQ; Appendix A	5 7.7 #37; R-340			M	M	Vendor Documentation Indicating Compliance
Overlapping alert message processing								
HNIEAS.31	If, during the display of alert_text(), a new cable_emergency_alert() message is received, the M-UDCP SHALL process it for duplicate detection, exception processing, and alert priority. If the overlapping alert passes these tests, alert_text() display SHALL be stopped, the text SHALL be erased, and the new alert SHALL be processed.	NIQ; Appendix A	5 7.2 #15; R-341			M	M	In-Band EAS
HNIEAS.32	If, when tuned to the Details channel as a result of processing a cable_emergency_alert() message, a new cable_emergency_alert() message is received, the M-UDCP SHALL process it for duplicate detection, exception processing, and alert priority. If the overlapping alert is discarded as a result of tests, the processing of the prior alert SHALL be unaffected.	NIQ; Appendix A	5 7.2 #16; R-342			M	M	In-Band EAS
HNIEAS.33	If, when tuned to the Details channel as a result of processing a cable_emergency_alert() message, a new cable_emergency_alert() message is received, the M-UDCP SHALL process it for duplicate detection, exception processing, and alert priority. If the overlapping alert passes these tests, the new alert SHALL be processed.	NIQ; Appendix A	7.2 # 17; R-343			M	M	In-Band EAS

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
HNIEAS.34	When tuned to a Details channel as a result of processing a cable_emergency_alert() message, and when a new cable_emergency_alert() message arrives that passes duplicate detection, exception processing, and alert priority tests, and when that new alert will require tuning to the same Details channel, the M-UDCP SHALL not cause an audio/video glitch to occur.	NIQ	7.2 # 19			M	M	In-Band EAS
	A cable_emergency_alert() message may be sent for the purposes of extending the time period spent on the Details channel.	NIQ	7.2 #14 8.1			I	I	
HNIEAS.35	When tuned to a Details channel as a result of processing a cable_emergency_alert() message, and when a new cable_emergency_alert() message arrives that passes duplicate detection, exception processing, and alert priority tests, and when that new alert will require tuning to the same Details channel, the M-UDCP SHALL remain on the Details channel for the amount of time indicated in the alert_message_time_remaining field given in the newly received alert (where the value 0 means “remain indefinitely”), or until an overlapping alert is processed that changes the channel, or until the channel is manually changed by the user.	NIQ	5, 8.1			M	M	In-Band EAS
HNIEAS.36	When tuned to a Details channel as a result of processing a cable_emergency_alert() message, and when a new cable_emergency_alert() message arrives that passes duplicate detection, exception processing, and alert priority tests, and when that new alert will require tuning to a different Details channel, the M-UDCP SHALL tune to the new Details channel.	NIQ	7.2 #19			M	M	In-Band EAS
HNIEAS.37	When tuned to a Details channel as a result of processing a cable_emergency_alert() message, and when a new cable_emergency_alert() message arrives that passes duplicate detection, exception processing, and alert priority tests, and when that new alert involves text display, the M-UDCP SHALL re-acquire the channel that had been interrupted by the original alert and then process the new alert.	NIQ	7.2 #17			M	M	In-Band EAS
HNIEAS.38	If, when tuned to the Details channel as a result of processing a cable_emergency_alert() message, a new cable_emergency_alert() message is received, the M-UDCP SHALL process it for duplicate detection, exception processing, and alert priority. If the overlapping alert is discarded as a result of these tests, processing of the prior alert SHALL be unaffected.	NIQ	7.2 #18			M	M	In-Band EAS

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
Descriptors processing								
HNIEAS.39	The M-UDCP SHALL remain unaffected by the presence or absence of one or more descriptors that may be present in the cable_emergency_alert() message.	NIQ	5 7.1 #13			M	M	In-Band EAS

3.2.1.5 Ratings

HNIRate.1	The M-UDCP SHALL process the content_advisory_descriptor () (0x87), when present, as defined in ATSC A/65-C and EIA 766-A and transported in either the PMT of the in-band MPEG-2 transport stream or passed across the CableCARD Extended Data Channel according to [HPIA].	Appendix A	R-370			M	C-M	Content Advisory
HNIRate.2	For the purposes of passing the content advisory information through on line 21 of the NTSC analog video output, the M-UDCP SHALL pass through line 21 fields 1 and 2, when present in the VBI of an analog channel as specified in [CEA-608-C].	Appendix A	R-371			M	M	Content Advisory
HNIRate.3	The M-UDCP SHALL reconstruct line 21, when present, as specified in CEA-608-C-and transported according to [ANSI/SCTE 21] or [ANSI/SCTE 20] on any analog NTSC output.	Appendix A	R-372			M	M	Content Advisory
HNIRate.4	If the M-UDCP provides analog component video or uncompressed digital output streams or has an integrated display, decoding and display of this content advisory data SHALL be provided by the M-UDCP as defined in [CEA-608-C] and required by FCC 47 CFR Part 15.120 [47CFR15].	Appendix A	R-201			M	C-M	Content Advisory
HNIRate.5	All M-UDCP's with integrated displays and without off-air tuning capability SHALL have a prior knowledge of the US region RRT and support EIA-766-A (i.e., the table is stored in the M-UDCP). The US rating_region SHALL be the default rating_ region for all M-UDCP's.	Appendix A	R-38			C-M	C-M	Content Advisory
HNIRate.7	The M-UDCP SHALL NOT be adversely affected by the receipt of a content advisory descriptor referencing a rating region unsupported by the M-UDCP.	Appendix A	R-373			M	M	Content Advisory
HNIRate.8	The M-UDCP SHALL NOT be adversely affected by presence or absence of an RRT.	Appendix A	R-374			M	M	Content Advisory

3.3 Parametric Specifications

3.3.1 Analog Copy Protection (Macrovision)

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
HACP.2	The M-UDCP SHALL use APS bits to control copy protection encoding on analog video outputs (Macrovision) as follows: APS=00 no encoding, utilize specific modes of analog protection encoding for APS=01,10,and 11. Note: Analog copy protection only applies to analog outputs as constrained by the license agreement.	HPIN	Table 9.1-3			M	M	Host Macrovision Vendor Documentation Indicating Compliance
HACP.5	The M-UDCP SHALL apply Macrovision encoding to all active NTSC analog video outputs (including RF, Composite or S-Video) and 480i / 480p component video output(s) when defined by the setting o the APS bits.	HPIR	Exhibit B 2.2.1			M	M	Host Macrovision

3.3.2 Maximum Individual Carrier Amplitude

HMIca.1	The M-UDCP SHALL not be adversely affected by the presence of the following interfering signals: 42 dBmV, 5 MHz to 30 MHz 24 dBmV, 30 MHz to 41 MHz 0 dBmV, 41 MHz to 48 MHz -10 dBmV, 48 MHz to 54 MHz	Appendix A	R-47			M	M	Host Maximum Individual Carrier
HMIca.2	The M-UDCP SHALL be capable of receiving signals where the maximum rms value of any other individual signal whose frequency exceeds 54 MHz SHALL be less than 10 mV across a 75 ohm terminating impedance (+20 dBmV) measured at the input to the M-UDCP.	Appendix A	R-48			M	M	Host Maximum Individual Carrier

3.3.4 FAT Channel RF Performance Parameters

HFATrf.1	The M-UDCP SHALL be capable of receiving and demodulating a Forward Application Transport channel with either 64 or 256 QAM modulation.	~~HB~~ Appendix A NII	R-12			M	M	Host FAT Channel, Host Channel Change
HFATrf.2	The M-UDCP SHALL be able to demodulate signals compliant with the SCTE 07 2006 for the transmission, Physical layer modulation, coding, synchronization, and Error Correction.	Appendix A NII	R-12			M	M	Host FAT Channel, Host Channel Change
HFATrf.5	The M-UDCP shall have tuning agility over the range of 54 MHz to 864MHz (IRC/HRC/Standard Channel Plans).	Appendix A	R-13			M	M	Host FAT Channel, FAT Channel HRC/IRC Tuning
HFATrf.7	The M-UDCP RF Input Impedance SHALL have a nominal impedance of 75 ohms unbalanced.	Appendix A	R-14			M	M	Host RF Input Return Loss
HFATrf.6	The M-UDCP RF Input Return Loss SHALL be 6 dB minimum over full tuning range.	Appendix A	R-15			M	M	Host RF Input Return Loss

	Feature	Spec	Ref	Support	Pass/Fail			ATP Test Name
						UHMT	UHMS	
HFATrf.8	The M-UDCP SHALL tune and receive Analog visual carrier signals over the RF Input Level Range from 0 dBmv minimum to +15 dBmv maximum.	Appendix A	R-16			M	M	Host FAT Channel
HFATrf.9	The M-UDCP SHALL tune and receive Analog aural carrier signals over the RF Input Level Range from: –10 to -17 dBc	Appendix A	R-17			M	M	Host FAT Channel
HFATrf.10	The M-UDCP SHALL tune and receive Digital 64 QAM signals over the RF Input Level Range signal from: -15 dBmV to +15 dBmV	Appendix A	R-18			M	M	Host FAT Channel
HFATrf.11	The M-UDCP SHALL tune and receive Digital 256 QAM signals over the RF Input Level Range signal from: –12 dBmV to +15 dBmV	Appendix A	R-19			M	M	Host FAT Channel
HFATrf.13	The M-UDCP SHALL tune and receive Standard/HRC/IRC signals that deviate over the allowable FCC tolerance range as described in 47 CFR 76.612.	Appendix A	R-20			M	M	Host FAT Channel, FAT Channel HRC/IRC Tuning
HFATrf.14	The M-UDCP LO Leakage (Input EMC) SHALL be < -37 dBmV over 54 MHz to 864 MHz.	Appendix A	R-369			M	M	Host FAT LO Leakage
HFATrf.23	The M-UDCP SHALL not be adversely affected by AM Hum Modulation on digital carriers of less than or equal to 3% p-p.	Appendix A	R-23			M	M	FAT Chanel AM Hum Modulation Immunity
HFATrf.26	The M-UDCP SHALL tune and receive with Group Delay Variation of < 0.25 usec/MHz across the 6-MHz channel. with Group Delay Variation introduced such that the Chroma/Luma delay of CFR47.76, the Amplitude Ripple of HFATrf.32 and the Microreflections of HFATrf.29 are not exceeded.	Appendix A	R-24			M	M	FAT Channel Micro-reflection
HFATrf.27	The M-UDCP SHALL tune and receive with Phase Noise of < -86 dBc/Hz @ 10 kHz offset (relative to the center of QAM signal spectrum).	Appendix A	R-25			M	M	FAT Channel Phase Noise Tolerance
HFATrf.28	The M-UDCP SHALL tune and receive with Amplitude Ripple on digital channels of < 5 dB p-p within the 6-MHz channel with Amplitude Ripple introduced such that the Chroma/Luma delay is less than CFR47.76, Group Delay Variation of HFATrf.26, and the Microreflections of HFATrf.29 are not exceeded.	Appendix A	R-26			M	M	FAT Channel Micro-reflection
HFATrf.32	The M-UDCP SHALL tune and receive with Amplitude Ripple on analog channels of < 4 dB p-p within the 6-MHz channel. with Amplitude Ripple introduced such that the Chroma/Luma delay is less than CRF47.76 , Group Delay Variation of HFATrf.26 and the Microreflections of HFATrf.29 are not exceeded.	Appendix A	R-27			M	M	FAT Channel Micro-reflection

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
HFATrf.29	The M-UDCP SHALL tune and receive with Microreflections of (assumes one dominant echo with max. specified amplitude in dB relative to the primary QAM signal): -10 dB at < 0.5 us -15 dB at < 1 us -20 dB at < 1.5 us -30 dB at < 4.5 us With Microreflections introduced such that the Chroma/Luma delay is less than CFR47.76, Group Delay Variation of HFATrf.26 and the Amplitude Ripple of HFATrf.32 are not exceeded.	Appendix A	R-28			M	M	FAT Channel Micro-reflection
HFATrf.31	The M-UDCP SHALL tune and receive signal with an interleaver depth of greater than or equal to I = 64 Burst Noise of not longer than 25-µs at 10-Hz repetition rate.	Appendix A	R-29			M	M	Combined Distortion

3.3.5 FD Channel RF Performance Parameters

Specifications that are Common to ANSI/SCTE 55-2 and ANSI/SCTE 55-1								
HFDCrf.5	The Forward Data Channel tuner SHALL have a frequency range of 70 to 130 MHz.	Appendix A	R-100			M	M	FDC tuning range and bit rate
HFDCrf.5a	The M-UDCP SHALL be able to tune any nominal carrier frequency in the FDC that is an integer multiple of 250kHz between the minimum and maximum carrier frequencies, inclusive and the specific fixed frequency of 104.200 MHz.	Appendix A NIA Table C	R-101			M	M	FDC tuning range and bit rate
HFDCrf.7	The M-UDCP SHALL be capable of receiving symbols transmitted with a Frequency acquisition range of +/- 50 ppm measured at the upper limit of the frequency range.	HPID; Appendix A	2.1.1; Table 2-2; R-30			M	M	FDC Tuning Range and Bit Rate
HFDCrf.8	The M-UDCP SHALL be capable of receiving FDC with a RF Input level range of -15 to +15 dBmV .	Appendix A	R-31			M	M	Host FDC Channel Parametric, FDC Adjacent Channel BER
HFDCrf.12	The M-UDCP SHALL tolerate a Group Delay variation in channel, measured over Nyquist bandwidth of 200 ns max in channel with Group Delay Variation introduced such that the Chroma/Luma delay is less than or equal to the Amplitude Ripple of HFATrf.32 and the Microreflections of HFATrf.29 are not exceeded.	Appendix A	R-32			M	M	FDC Tuning Range and Bit Rate
ANSI SCTE 55-2 Standard								
HFDCrf.19	The M-UDCP SHALL use Differentially Encoded QPSK for demodulation.	HPID	2.1.1; Table 2-2, item 2			M	M	FDC Adjacent Channel BER
HFDCrf.20	The M-UDCP SHALL provide an (a=0.03) square root raised cosine receive filter.	HPID	2.1.1; Table 2-2, item 3			M	M	FDC Adjacent Channel BER
HFDCrf.23	The receiver in the M-UDCP SHALL be capable of receiving symbols transmitted with a Frequency Stability of +/- 50 ppm measured at the upper limit of the frequency range.	HPID	2.1.1; Table 2-2			M	M	FDC Adjacent Channel BER FDC tuning range and bit rate

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
HFDCrf.24	The M-UDCP SHALL be capable of receiving symbols created with a Symbol Rate Accuracy of +/- 50 ppm.	HPID	2.1.1; Table 2-2			M	M	FDC Tuning Range and Bit Rate
HFDCrf.25	The M-UDCP SHALL be capable of receiving a signal produced by a transmitter with a Power Spectrum equal to: QPSK Downstream Transmitter Power Spectrum: |(f - fc)/fN | < 1-a0 +/-. 0.25 dB at 1 -3 +/-. 0.25 dB at 1+a≤-21 dB >2 ≤-40 dB	HPID	2.1.1; Table 2-2			M	M	FDC Adjacent Channel BER
HFDCrf.26	The M-UDCP SHALL operate with carrier suppression that is > 30 dB.	HPID	2.1.1; Table 2-2			M	M	FDC Tuning Range
HFDCrf.27	The M-UDCP SHALL operate when I/Q Amplitude Imbalance < 1.0 dB.	HPID	2.1.1; Table 2-2			M	M	FDC Tuning Range and Bit Rate
HFDCrf.27A	The M-UDCP SHALL operate within the I/Q phase imbalance of less than or equal to 2 degrees.	HPID	2.1.1; Table 2-2			M	M	FDC Tuning Range and Bit Rate
HFDCrf.29	The M-UDCP SHALL operate within a C/N at the demodulator input of: > 20 dB @ BER<1x10E-10 (after error correction) measured at Input to M-UDCP. (i.e. 1 error in 2 hours at 1.5 Mbps/s)	HPID	2.1.1; Table 2-2			M	M	FDC Adjacent Channel BER
ANSI SCTE 55-1 Standard								
HFDCrf.32	The M-UDCP SHALL operate within the I/Q amplitude imbalance of less than or equal to 0.5dB.	HPIE	5.1.4, table 3			M	M	FDC Adjacent Channel BER
HFDCrf.33	The M-UDCP SHALL operate within the I/Q phase imbalance of 1 degree typical.	HPIE	5.1.4, table 3			M	M	FDC Adjacent Channel BER

3.3.6 RF Signal Levels and Adjacent Channel Characteristics

HRFAcc.1	The M-UDCP SHALL be capable of receiving an analog signal with a visual signal level that is within ± 3 dB of the visual signal level of any adjacent analog channel (within a 6 MHz nominal frequency separation as specified in [47CFR76.605].	Appendix A	R-49			M	M	Adjacent Channel Characteristics

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
	The analog signal power is measured as the peak envelope power (PEP), which is the average RMS carrier power measured during horizontal sync level. The digital signal power is measured as the average RMS signal power.							
HRFAcc.3	The M-UDCP SHALL be capable of receiving NTSC analog signals with "Worst Case" Adjacent Channel performance of: Undesired D/U Ratio 64 QAM -1.0 dB 256 QAM -6.0dB QPSK FDC -6.0dB	Appendix A	R-50			M	M	Adjacent Channel Characteristics
HRFAcc.4	The M-UDCP SHALL be capable of receiving digital 64 QAM signals with "Worst Case" Adjacent Channel performance of: Undesired D/U Ratio Analog NTSC -21.0 dB 256 QAM -21.0dB QPSK FDC -21.0dB	Appendix A	R-51			M	M	Adjacent Channel Characteristics
HRFAcc.5	The M-UDCP SHALL be capable of receiving digital 256 QAM signals with "Worst Case" Adjacent Channel performance of: Undesired D/U Ratio Analog NTSC -16.0 dB 64 QAM -11.0dB QPSK FDC -16.0dB	Appendix A	R-52			M	M	Adjacent Channel Characteristics
HRFAcc.6	The M-UDCP SHALL be capable of receiving digital QPSK FDC signals with "Worst Case" Adjacent Channel performance of: Undesired D/U Ratio Analog NTSC -22.0 dB 64 QAM -17.0dB 256 QAM -22.0dB	Appendix A	R-53			M	M	Adjacent Channel BER
HRFAcc.8	Independently of meeting the requirements listed in RF Signal Levels and Adjacent Channel Characteristics and Adjacent Channel Characteristics, the M-UDCP SHALL be capable of receiving digital 64QAM with characteristics: 1) Level = -10 dBmV on channel 82 2) Interleaver depth of greater than or equal to I=64 (J=2) 3) 33 dB C/N 4) -18 dB ghost at 0.5 us 5) 25 us burst noise not greater than -15 dBmV at 10 Hz rep rate.	Appendix A	R-54			M	M	Combined Distortion

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
HRFAcc.8a	Independently of meeting the requirements listed in RF Signal Levels and Adjacent Channel Characteristics and Adjacent Channel Characteristics, the M-UDCP SHALL be capable of receiving digital 256QAM with characteristics: 1) Level = -7 dBmV on channel 82 2) Interleaver depth of greater than or equal to I=64 (J=2) 3) 36 dB C/N 4) -18 dB ghost at 0.5 us 5) 16 us burst noise not greater than -12 dBmV at 10 Hz rep rate.	Appendix A	R-54a			M	M	Combined Distortion

3.3.7 M-UDCP Functionality Without a Card

(The PICS items in this section apply when no Card has ever been inserted, or had been inserted and has been removed.)

Hnop.1	The M-UDCP SHALL tune (and display or cause to be displayed if applicable) unscrambled analog NTSC audio-visual programming delivered in adherence to Standard, HRC or IRC frequency plans of EIA/CEA –542-B.	Appendix A	R-55			M	M	In-Band PSIP
Hnop.2	The M-UDCP SHALL discover, tune (and display or cause to be displayed if applicable) unscrambled digital services, delivered in adherence to Standard, HRC or IRC frequency plans of EIA/CEA -542-B.	Appendix A	R-56			M	M	Host FAT Channel, In-Band PSIP
Hnop.3	The M-UDCP operating without a CableCARD Device while tuned to a digital transport stream containing multiple programs and a CVCT is present each program SHALL be identified by the one-part channel number if present. Each program SHALL be identified by the two-part channel number if the one-part channel number is not present.	Appendix A	A-376			M	M	In-Band PSIP
Hnop.3a	The M-UDCP operating without a CableCARD Device while tuned to a digital transport stream containing multiple programs and the CVCT is not present, then each program SHALL be identified by the two-part channel number from the TVCT.	Appendix A	A-377			M	M	In-Band PSIP
Hnop.3b	When no Card is present and when one or more unscrambled services are available in the Transport Stream, and when a CVCT is present to describe one or more of the unscrambled services, the M-UDCP SHALL use the CVCT for navigation to the unscrambled services.	Appendix A	R-57b			M	M	In-Band PSIP
Hnop.3c	When no Card is present and when one or more unscrambled services are available in the Transport Stream, and when no CVCT is present, but a TVCT is present to describe one or more of the unscrambled services, the M-UDCP SHALL use the TVCT for navigation to the unscrambled services.	Appendix A	R-57c			M	M	In-Band PSIP

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
Hnop.17	When the M-UDCP is operating without a Card, any channel map created from OOB data while previously operating with a Card SHALL NOT be used.	Appendix A	R-59			M	M	Host Channel Change
	Based on the availability from the content provider, Digital Transport Streams that include one or more services in the clear will include virtual channel data in-band in the form of ATSC A/65C (PSIP). An in-the-clear program is one in which the PMT has no CA descriptor. A one or two-part channel number and a textual channel name will identify each channel.	HE						
Hnop.10	The M-UDCP SHALL NOT be adversely affected by the presence of any valid PSIP data, content or structure.	Appendix A	R-60			M	M	In-Band PSIP

3.3.8 M-UDCP Support of Card Interface while in Standby Mode

Hstby.1	When the M-UDCP is in Standby mode, it SHALL keep the OOB receive circuitry fully powered.	HPIA	7.4.1.1			M	M	Host Standby Mode
Hstby.2	When the M-UDCP is in Standby mode, it SHALL keep the Card fully powered.	HPIA	7.4.1.1			M	M	Host Standby Mode

3.3.9 Transport Stream Data Rates

HstDr.1	The M-UDCP SHALL be required to support transport stream interface data rates of 26.97035Mb/s and 38.8107 Mb/s averaged over the period between the sync bytes of successive transport packets with allowable jitter of +/- one MCLKI clock period.	HPIA	7.2.1			M	M	Host Transport Stream Data Rate

3.3.10 NTSC Analog Channels /VBI Pass Through

HVBIPT.1	The M-UDCP SHALL receive and process analog channels (that are NTSC RF AM-VSB modulated) in accordance with current cable-system practice and applicable FCC rules.	Appendix A	R-34			~~C~~ M	~~C~~ M	Host VBI Pass-Through

3.3.11 Analog Closed Caption

HNIACC.1	For analog NTSC, closed captions are carried in line 21 of the vertical blank line (VBI). The encoding of NTSC closed caption is based on FCC part 15.119 and CEA-608-C. M-UDCP with integrated displays and without off-air tuning capability SHALL be able to display this information.	Appendix A	R-35			M	N/A	Host Analog Closed Caption

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
HNIACC.2	For analog NTSC if the M-UDCP provides 480p or greater analog component video outputs or uncompressed digital output streams, decoding and rendering of the 608 line 21 caption data when present SHALL be provided according to [47CFR15.122].	Appendix A	R-377			C-M	C-M	Host Analog Closed Caption

3.3.12 Digital Closed Caption

HSTDCC.1	If the M-UDCP includes baseband video outputs, The M-UDCP SHALL process NTSC Closed Captioning information, when present in the MPEG-2 Picture User Data, as specified in section 4 of [EIA 708B], or as specified in [CEA-608-C] and transported according to [ANSI/SCTE 21]or [ANSI/SCTE 20], on a program-by-program basis. This will include all data of cc_type 00 and 01, as defined in [EIA-708-B]. The M-UDCP SHALL reconstruct line 21 VBI (both field 1 and field 2) according to [CEA-608-C] and as required by [47CFR15] on all NTSC analog video outputs and 480i component video outputs.	Appendix A NIV HI HG NIN	R-36			C-M	C-M	Host VBI Pass-Through, Closed Caption from Digital Source
HSTDCC.2	The M-UDCP SHALL process and extract closed captioning information from MPEG picture level user_data() fields formatted and transported using ANSI SCTE 20 2001, or MPEG picture level user_data() fields formatted and transported using ANSI SCTE 21.	Appendix A NIV	R-36a			M	M	Closed Caption from Digital Source
HSTDCC.3	In the case where a MPEG picture level user_data() field includes caption data formatted and transported via both aforementioned methods [ANSI/SCTE 21] and [ANSI/SCTE 20], the M-UDCP SHALL use closed captioning data recovered from either method as specified in [ANSI/SCTE 43].	Appendix A NIV NIN NIU	R-36b			M	M	Closed Caption from Digital Source
HSTDCC.70	The M-UDCP SHALL be capable of extracting [ANSI/SCTE 21] or [ANSI/SCTE 20] caption data in the presence of private user_data. Note: This private user data may appear in various order as compared to the standard user data (such as first, second, third).	Appendix A	R-378			M	M	Closed Caption from Digital Source
HSTDCC.69	If the M-UDCP provides 480p or greater analog component video outputs or uncompressed digital output streams, decoding and rendering of the 608 this caption data [cc_type 00 and 01] transported via [ANSI/SCTE 21] or [ANSI/SCTE 20] SHALL be provided according to [47CFR15.122].	HJ	47CFR15.122			C-M	C-M	Closed Caption from Digital Source

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
HSTDCC.71	The M-UDCP with integrated display SHALL decode and render the 608 caption data [cc_type 00 and 01] transported via [ANSI/SCTE 21] or [ANSI/SCTE 20] when present, according to [47CFR15.122].	HJ	47CFR15.122			M	N/A	Closed Caption from Digital Source
HSTDCC.15	The M-UDCP with integrated display SHALL decode and render the DTVCC caption data (with cc_type set to '10' or '11') as specified in [EIA 708B] and delivered according to [SCTE 21].	NIV	4.2			M	N/A	Closed Caption from Digital Source
HSTDCC.72	The M-UDCP SHALL decode and render the DTVCC caption data (with cc_type set to '10' or '11') as specified in [EIA 708B] and delivered according to [SCTE 21] on any 480p or greater analog component video outputs or uncompressed digital video outputs.	NIV	4.2			C-M	C-M	Closed Caption from Digital Source
HSTDCC.73	The M-UDCP MAY decode and render the DTVCC caption data (with cc_type set to '10' or '11') as specified in [EIA 708B] and delivered according to [SCTE 21] on any NTSC video outputs or 480i component video outputs.	NIV	4.2			O	O	Closed Caption from Digital Source
HSTDCC.12	The M-UDCP SHALL process the caption_service_descriptor, when present, as defined by [ATSC A/65C] and carried in either the PMT of the in-band MPEG-2 transport stream or passed across the CableCARD Extended Data Channel according to [CCIF2.0].	NIR	6.9.2			M	M	Closed Caption from Digital Source

3.3.13 Mechanical

HMech.1	The M-UDCP SHALL provide a thermal design for the Card, such that while operating with a reference power load Card drawing an average of 2.5 Watts, no non-consumer-accessible surface point SHALL be hotter than 65°C in a room where the ambient temperature is 40°C.	Appendix A	R-61			M	M	Host-CableCARD Temperature / Average Power
HMech.31	Prior to production, the manufacturer shall demonstrate or document that the M-UDCP meets the requirements of 47 CFR 15.118 (c)(3) Direct pickup interference.	Appendix A	R-202			M	M	Vendor Documentation Indicating Compliance
HMech.7	The M-UDCP SHALL meet radiated emissions limits caused by cable signals on the product's cable RF connector input in accordance with 47 CFR 76.605 (12) (15 uV/m at 30 m for frequencies outside the range 54 to 216 MHz and 20 uV/m at 3 m for frequencies inside the range 54 to 216 MHz).	Appendix A	R-200			M	M	Vendor Documentation Indicating Compliance

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name

3.3.14 Other Requirements of a M-UDCP

UniDir.1	The M-UDCP's conducted emissions (including LO and spurious) at the RF input SHALL be less than or equal to -30 dBmV over the range 54 MHz to 864 MHz and -26 dBmV over the range 5 MHz up to but not including 54 MHz, measured with a 9 kHz bandwidth.	Appendix A	R-4			M	M	Host Emissions

3.3.15 Virtual channel number processing

VirtChan.1	When an out-of-band channel is available and profiles 4 or 5 are in use, the M-UDCP SHALL use the two-part channel number in the two_part_channel_number_ descriptor(), if such descriptor is present for a given channel, for identification and navigation of that channel.	Appendix A	R-60b			M	M	SCTE 65 Service Information

3.3.16 High Definition Support

HDST.15	If the M-UDCP has a HMDI or DVI output, for the manufacturer's first M-UDCP or UDCP, manufacturer agrees to participate with cable operators and cable operator vendors in a digital interface plugfest event.	Appendix A	R-40			C-M	C-M	Vendor Documentation Indicating Compliance
HDST.13	If analog component video outputs are present, the M-UDCP SHALL comply with [CEA-770.3-C] and employ three RCA Phono jack connectors as designated in Section 10 of [CEA-770.3-C].	HK	10			C-M	C-M	Digital Video Compression

3.3.16 Uncompressed Digital Video Interface

UDVI.1	The M-UDCP MAY provide support for an uncompressed digital video interface (output) using either Digital Visual Interface [DVI] or High-Definition Multimedia Interface [HDMI].	Appendix A	R-347			O	O	Uncompressed Digital Video Interface & Signal
UDVI.2	The M-UDCP MAY provide support for an uncompressed digital video interface (input) using either Digital Visual Interface [DVI] or High-Definition Multimedia Interface [HDMI].	Appendix A	R-348			O	O	Uncompressed Digital Video Interface & Signal
UDVI.4	If the M-UDCP includes a DVI output, it SHALL use a female DVI-D connector, which at a minimum supports the Single Link Transmission Minimized Differential Signaling as defined in [DVI].	Appendix A	R-349			C-M	C-M	Uncompressed Digital Video Interface & Signal

	Feature	Spec	Ref	Support	Pass/Fail	UHMT	UHMS	ATP Test Name
UDVI.4a	If the M-UDCP Terminal includes a DVI input, it SHALL use a female DVI-D connector, which at a minimum supports the Single Link Transmission Minimized Differential Signaling as defined in [DVI].	Appendix A	R-350			C-M	N/A	Uncompressed Digital Video Interface & Signal
UDVI.5	If the M-UDCP includes an HDMI output, it SHALL use a female HDMI connector, which at a minimum supports the Single Link Transmission Minimized Differential Signaling as defined in [HDMI].	Appendix A	R-351			C-M	C-M	Uncompressed Digital Video Interface & Signal
UDVI.5a	If the M-UDCP includes an HDMI input it SHALL use a female HDMI connector, which at a minimum supports the Single Link Transmission Minimized Differential Signaling as defined in [HDMI].	Appendix A	R-352			C-M	N/A	Uncompressed Digital Video Interface & Signal
UDVI.7	The DVI or HDMI interface on the M-UDCP SHALL employ the HDCP encryption system as defined in [HDCP].	HL	4			C-M	C-M	Uncompressed Digital Video Interface & Signal
UDVI.8	The M-UDCP SHALL enable HDCP encryption when the EMI Bits in the CCI are greater than 00 when video is transmitted over the DVI or HDMI link.	Appendix A	R-344			C-M	C-M	Uncompressed Digital Video Interface & Signal
UDVI.9	If HDCP authentication fails, then the M-UDCP SHALL not transmit video over the DVI or HDMI link, excluding any alerts generated by the M-UDCP informing the user of the condition. Note: Continued transmission of a blank video field over the DVI or HDMI link for the purpose of muting video in this case is acceptable.	Appendix A	R-345			C-M	C-M	Copy Protection Support

3.4 Host Extensions

Note: These Requirements are mandatory ONLY for Hosts implementing these Extensions.

3.4.1 Multi-FAT Support

MHOST.3	The M-UDCP, when supporting multiple FAT tuners SHALL provide an implementation of the M-CARD interface operating in M-Mode as specified in HPIA.	Appendix A	R-355			C-M	C-M	Multi-FAT Receiver Test
MHOST.4	The M-UDCP in M-Mode, when supporting multiple FAT tuners SHALL implement M-Mode Copy Protection as defined in HPIN.	Appendix A	R-356			C-M	C-M	Multi-FAT Receiver Test
MHOST.5	The M-UDCP in M-Mode, when supporting multiple FAT tuners SHALL support the simultaneous reception of at least two independent FAT channels anywhere in the FAT channel RF frequency range and deliver the demodulated streams to the Card using the multi-stream mode defined in HPIA.	Appendix A	R-357			C-M	C-M	Multi-FAT Receiver Test

	Feature	Spec	Ref	Support	Pass/Fail			ATP Test Name
						UHMT	UHMS	
MHOST.6	All FAT tuners SHALL meet the same performance requirements as specified in this M-UDCP PICS.	Appendix A	R-358			C-M	C-M	Multi-FAT Receiver Test
MHOST.7	The M-UDCP in M-Mode, when supporting multiple FAT tuners SHALL support reception of all FAT channels and interface to all cable signals through a single RF input connector.	Appendix A	R-359			C-M	C-M	Multi-FAT Receiver Test
MHOST.8	The M-UDCP SHALL provide a way to display either by picture in picture , or by special key-stroke sequence the ability to toggle between tuners, and to be able to identify/ differentiate specific tuner functions independently of the other tuners.	Appendix A	R-379			C-M	C-M	Multi-FAT Receiver Test

Appendix A – Requirements Not Contained In Referenced Standards

A.1 Requirements

R-1	*The Multi-Stream Uni-Directional Receiving Device SHALL be capable of supporting a draw of up to 250mA while maintaining 3.3V +/- 0.3 VDC (per POD) on the VPP pins before reading the Card Information Structure (CIS).*
R-2	*If the Multi-Stream Uni-Directional Receiving Device does support the value of 0x3h in the Power field of the Feature Selection Byte (TPCE_FS), the Multi-Stream Uni-Directional Receiving Device SHALL supply either 3.3V or 5V as requested on VPP1 and VPP2 pins.*
R-3a	*If the Multi-Stream Uni-Directional Receiving Device is operating in the Polling mode, it SHALL poll the POD no less frequently than once every 100 mSec.*
R-3b	*If the Multi-Stream Uni-Directional Receiving Device is operating in the interrupt mode, it SHALL respond to interrupts within 100 mSec and poll the POD no less frequently than once every 5 seconds*
R-4	*The Multi-Stream Uni-Directional Receiving Device 's conducted emissions (including LO and spurious) at the RF input SHALL be less than or equal to -30 dBmV over the range 54 MHz to 864 MHz and -26 dBmV over the range 5 MHz up to but not including 54 MHz, measured with a 9 kHz bandwidth.*
R-9	*Multi-Stream Uni-Directional Receiving Device SHALL be able to process MPEG-2 compliant Transport Streams in accordance with ANSI/SCTE-54 2002 as amended by DVS/435r4.*
R-9a	*Multi-Stream Uni-Directional Receiving Device SHALL not be adversely affected by the presence of an incorrect service location descriptor in the PSIP TVCT.*
R-10	*Multi-Stream Uni-Directional Receiving Device SHALL not be adversely affected by the presence or absence of descriptors not identified as required elsewhere in this document.*
R-11	*The Multi-Stream Uni-Directional Receiving Device SHALL be able to navigate (tune) using the System information when it is carried in OOB-FDC, as described in reference NIR.*
R-12	*The Multi-Stream Uni-Directional Receiving Device SHALL be able to demodulate signals compliant with the ANSI/ SCTE 07 2000 ~~6~~ (NII) for the transmission, Physical layer modulation, coding, synchronization, and Error Correction.*
R-13	*The Multi-Stream Uni-Directional Receiving Device shall have tuning agility over the range of 54 MHz to 864MHz (IRC/HRC/Standard Channel Plans).*
R-14	*RF Input Impedance SHALL have a nominal impedance of 75 ohms unbalanced.*
R-15	*The Multi-Stream Uni-Directional Receiving Device RF Input Return Loss SHALL be 6 dB minimum over full tuning range.*

R-16	***The Multi-Stream Uni-Directional Receiving Device SHALL tune and receive Analog visual carrier signals over the RF Input Level Range from 0 dBmv minimum to +15 dBmv maximum.***
R-17	***The Multi-Stream Uni-Directional Receiving Device SHALL tune and receive Analog aural carrier signals over the RF Input Level Range from–10 to -17 dBc.***
R-18	***The Multi-Stream Uni-Directional Receiving Device SHALL tune and receive Digital 64 QAM signals over the RF Input Level Range signal from -15 dBmv to +15 dBmv.***
R-19	***The Multi-Stream Uni-Directional Receiving Device SHALL tune and receive Digital 256 QAM signals over the RF Input Level Range signal from –12 dBmV to +15 dBmV.***
R-20	***The Multi-Stream Uni-Directional Receiving Device SHALL tune and receive Standard/HRC/IRC signals that deviate over the allowable FCC tolerance range as described in 47 CFR 76.612.***
R-23	***The Multi-Stream Uni-Directional Receiving Device SHALL not be adversely affected by AM Hum Modulation on digital carriers of less than or equal to 3% p-p.***
R-24	***The Multi-Stream Uni-Directional Receiving Device SHALL tune and receive with Group Delay Variation of < 0.25 msec/MHz across the 6-MHz channel. with Group Delay Variation introduced such that the Chroma/Luma delay of CFR47.76, the Amplitude Ripple of HFATrf.32 and the Microreflections of HFATrf.29 are not exceeded.***
R-25	***The Multi-Stream Uni-Directional Receiving Device SHALL tune and receive with Phase Noise of < -86 dBc/Hz @ 10 kHz offset (relative to the center of QAM signal spectrum).***
R-26	***The Multi-Stream Uni-Directional Receiving Device SHALL tune and receive with Amplitude Ripple on digital channels of < 5 dB p-p within the 6-MHz channel with Amplitude Ripple introduced such that the Chroma/Luma delay is less than CFR47.76, Group Delay Variation of HFATrf.26, and the Microreflections of HFATrf.29 are not exceeded.***
R-27	***The Multi-Stream Uni-Directional Receiving Device SHALL tune and receive with Amplitude Ripple on analog channels of < 4 dB p-p within the 6-MHz channel. with Amplitude Ripple introduced such that the Chroma/Luma delay is less than CRF47.76 , Group Delay Variation of HFATrf.26 and the Microreflections of HFATrf.29 are not exceeded.***

R-28	*The Multi-Stream Uni-Directional Receiving Device SHALL tune and receive with Microreflections of: (assumes one dominant echo with max. specified amplitude in dB relative to the primary QAM signal)* *-10 dB at < 0.5us* *-15 dB at < 1 us* *-20 dB at < 1.5us* *-30 dB at < 4.5 us* *With Microreflections introduced such that the Chroma/Luma delay is less than CFR47.76, Group Delay Variation of HFATrf.26 and the Amplitude Ripple of HFATrf.32 are not exceeded.*
R-29	*The Multi-Stream Uni-Directional Receiving Device SHALL tune and receive signal with an interleaver depth of greater than or equal to I = 64 Burst Noise of not longer than 25-µs at 10-Hz repetition rate.*
R-30	*The Multi-Stream Uni-Directional Receiving Device SHALL be capable of receiving symbols transmitted with a Frequency Stability of +/- 50 ppm measured at the upper limit of the frequency range.*
R-31	*The Multi-Stream Uni-Directional Receiving Device SHALL be capable of receiving FDC with a RF Input level range of-15 to +15 dBmV.*
R-32	*The Multi-Stream Uni-Directional Receiving Device SHALL tolerate a Group Delay variation in channel, measured over Nyquist bandwidth of 200 ns max in channel. With Group Delay Variation introduced such that the Chroma/Luma delay is less than or*
R-33	*The Multi-Stream Uni-Directional Receiving Device SHALL not be adversely affected by any audio service type (bsmod) defined in HD Annex B Table B2.*
R-34	*The Multi-Stream Uni-Directional Receiving Device SHALL receive analog channels that are NTSC RF AM-VSB modulated signals in accordance with current cable-system practice and applicable FCC rules.*
R-35	*For analog NTSC, closed captions are carried in line 21 of the vertical blank line (VBI). The encoding of NTSC closed caption is based on FCC part 15.119 and CEA/EIA-608-B.Uni-Directional Receiving Devices with integrated displays and without off-air*
R-36	*The Multi-Stream Uni-Directional Receiving Device SHALL process and extract closed captioning information from MPEG picture level user_data() fields formatted and transported using ANSI SCTE 21 2001, when present, identified with user_data_type_code value of '0x03' and cc_type values '00' and '01' and carried in the cc_data_1 and cc_data_2 fields.*
R-36a	*The Multi-Stream Uni-Directional Receiving Devices built before July 1st, 2008, SHALL process and extract closed captioning information from MPEG picture level user_data() fields formatted and transported using ANSI SCTE 20 2001, when present, unless MPEG picture level user_data() fields formatted and transported using SCTE 21 is also available.*
R-36b	*In the case where a MPEG picture level user_data() field includes data formatted and transported via both aforementioned methods (SCTE 20 and SCTE 21), the Multi-Stream Uni-Directional Receiving Device MAY use closed captioning data recovered from either method.*
R-36c	*In the case where a MPEG picture level user_data() field formatted and transported via SCTE 21 includes any cc_type values of '10' or '11', the Multi-Stream Uni-Directional Receiving Device MAY use such data exclusively for captioning operation, notwithstanding the output requirements of HSTDCC.4.*

R-36d	*The Multi-Stream Uni-Directional Receiving Device SHALL, on all NTSC analog outputs, modulate such extracted data (R-36, R-36a, R-36b) on video line 21 (both fields) as specified in 47 CFR 15.122 and EIA/CEA-608-B*
R-37	*If the Multi-Stream Uni-Directional Receiving Device with an integrated display and without off-air tuning capability provides component analog or uncompressed digital output streams, decoding and display of this caption data (R-36, R-36a, R-36b) SHALL be provided according to 47 CFR 15.122*
R-38	*All Multi-Stream Uni-Directional Receiving Devices with integrated displays and without off-air tuning capability SHALL have a priori knowledge of the US region RRT and support EIA-766-A (i.e., the table is stored in the Uni-Directional Receiving Device). The US rating_region SHALL be the default rating_ region for all Uni-Directional Receiving Devices.*
R-40	*If the Multi-Stream Uni-Directional Receiving Devices has a HMDI or DVI output, the manufacturer's first Uni-Directional Cable Receiving Device, manufacturer agrees to participate with cable operators and cable operator vendors in a digital interface plugfest event.*
R-47	*The Multi-Stream Uni-Directional Receiving Device SHALL not be adversely affected by the presence of the following interfering signals:* *42 dBmV, 5 MHz to 30 MHz* *24 dBmV, 30 MHz to 41 MHz* *0 dBmV, 41 MHz to 48 MHz* *-10 dBmV, 48 MHz to 54 MHz*
R-48	*The Multi-Stream Uni-Directional Receiving Device SHALL be capable of receiving signals where the maximum rms value of any other individual signal whose frequency exceeds 54 MHz SHALL be less than 10 mV across a 75 ohm terminating impedance (+20 dBmV) measured at the input to the Uni-Directional Receiving Device.*
R-49	*The Multi-Stream Uni-Directional Receiving Device SHALL be capable of receiving an analog signal with a visual signal level that is within ± 3 dB of the visual signal level of any adjacent analog channel (within a 6 MHz nominal frequency separation as specified in 47CFR 76.605).*
R-50	*The Multi-Stream Uni-Directional Receiving Device SHALL be capable of receiving digital and NTSC analog signals with "Worst Case" Adjacent Channel performance of:* *Undesired — D/U Ratio* *64 QAM — -1.0 dB* *256 QAM — -6.0dB* *QPSK FDC — -6.0dB*
R-51	*The Multi-Stream Uni-Directional Receiving Device SHALL be capable of receiving digital 64 QAM signals with "Worst Case" Adjacent Channel performance of:* *Undesired — D/U Ratio* *Analog NTSC — -21.0 dB* *256 QAM — -21.0dB*

	QPSK FDC -21.0dB
R-52	*The Multi-Stream Uni-Directional Receiving Device SHALL be capable of receiving digital 256 QAM signals with "Worst Case" Adjacent Channel performance of:* *Undesired D/U Ratio* *Analog NTSC -16.0 dB* *64 QAM -11.0dB* *QPSK FDC -16.0dB*
R-53	*The Multi-Stream Uni-Directional Receiving Device SHALL be capable of receiving digital QPSK FDC signals with "Worst Case" Adjacent Channel performance of:* *Undesired D/U Ratio* *Analog NTSC -22.0 dB* *64 QAM -17.0dB* *256 QAM -22.0dB*
R-54	*Independently of meeting the requirements listed above the Multi-Stream Uni-Directional Receiving Device SHALL be capable of receiving digital QAM 64 signals with the following characteristics:* *1.) Level = -10 dBmV on channel 82* *2.) Interleaver depth of greater than or equal to I=64 (J=2)* *3.) 33 dB C/N* *4.) -18 dB ghost at < 0.5 µsec.* *5.) 25 µsec burst noise not greater than –15 dBmV at a 10 Hz repetition rate.*
R-54a	*Independently of meeting the requirements listed above the Multi-Stream Uni-Directional Receiving Device SHALL be capable of receiving digital QAM 256 signals with the following characteristics:* *1.) Level = -7 dBmV on channel 82* *2.) Interleaver depth of greater than or equal to I=64 (J=2)* *3.) 36 dB C/N* *4.) -18 dB ghost at < 0.5 µsec.* *5.) 16 µsec burst noise not greater than –12 dBmV at a 10 Hz repetition rate.*
R-55	*The Multi-Stream Uni-Directional Receiving Device SHALL tune (and display or cause to be displayed if applicable) unscrambled analog NTSC audio-visual programming delivered in adherence to Standard, HRC or IRC frequency plans of EIA/CEA-542-B ~~A~~*
R-56	*The Multi-Stream Uni-Directional Receiving Device SHALL discover, tune (and display or cause to be displayed if applicable) unscrambled digital services, delivered in adherence to Standard, HRC or IRC frequency plans of EIA/CEA-542-B ~~A~~ .*

R-57b	*When no Card is present and when one or more unscrambled services are available in the Transport Stream, and when a CVCT is present to describe one or more of the unscrambled services, the Multi-Stream Unidirectional Receiving Device SHALL use the CVCT for navigation to the unscrambled services.*
R-57c	*When no Card is present and when one or more unscrambled services are available in the Transport Stream, and when no CVCT is present, but a TVCT is present to describe one or more of the unscrambled services, the Multi-Stream Unidirectional Receiving Device SHALL use the TVCT for navigation to the unscrambled services.*
R-59	*When the Multi-Stream Uni-Directional Receiving Device is operating without a POD any channel map created from OOB data while previously operating with a POD shall not be used.*
R-60	*The Multi-Stream Uni-Directional Receiving Device MUST not be adversely affected by the presence of any valid PSIP data, content or structure.*
R-60b	*When an out-of-band channel is available and profiles 4 or 5 are in use, the Multi-Stream Uni-Directional Receiving Device SHALL use the two-part channel number in the two_part_channel_number_ descriptor(), if such descriptor is present for a given channel, for identification and navigation of that channel.*
R-61	*The Multi-Stream Uni-Directional Receiving Device SHALL provide a thermal design for the POD, such that while operating with a reference power load POD drawing an average of 2.5 Watts, no non-consumer-accessible surface point is hotter than 65°C in a room where the ambient temperature is 40°C.*
R-100	*The Multi-Stream Uni-Directional Receiving Device SHALL be able to tune FDC signals over the range from 70 MHz to 130 MHz.*
R-101	*The Multi-Stream Uni-Directional Receiving Device SHALL be able to tune any nominal carrier frequency in the FDC that is an integer multiple of 250 kHz between the minimum and maximum carrier frequencies, inclusive and the specific fixed frequency of 104.200 MHz.*
R-102	*When the Host / Card pairing information screen application info APDU is selected after the Card has provided an invalid certificate to the Multi-Stream Uni-Directional Receiving Device, then the M-UDRD SHALL generate and display the following message: “Please call your cable operator and report an invalid CableCARD”*
R-200	*The Multi-Stream Uni-Directional Receiving Device SHALL meet radiated emissions limits caused by cable signals on the product's cable RF connector input in accordance with 47 CFR 76.605 (15 uV/m at 30 m for frequencies outside the range 54 to 216 MHz and 20 uV/m at 3 m for frequencies inside the range 54 to 216 MHz).*
R-201	*The Multi-Stream Uni-Directional Receiving Devices with integrated display and without off-air tuning capability that also provide component analog or uncompressed digital output streams, SHALL decode and display content advisory dat as defined by CEA/EIA-608-B and required by FCC 47 CFR Part 15.120*
R-202	*Prior to production, the manufacturer SHALL demonstrate or document that the Multi-Stream Uni-Directional Receiving Device meets the requirements of 47 CFR 15.118 (c)(3) Direct pickup interference.*

R-300	***The Multi-Stream Uni-Directional Receiving Device SHALL validate the X.509 version 3 Card Device certificates as defined in Table A-3***
R-301	***The Multi-Stream Uni-Directional Receiving Device signature mechanism SHALL use SHA-1 with RSA Encryption with specific OID 1.2.840.113549.1.1.5***
R-302	***The Multi-Stream Uni-Directional Receiving Device SHALL have a Root CA Certificate as defined in Table A-1***

Table A-1: CableLabs Manufacturer Root CA Certificate

Certificate Field	Certificate Field Description
Subject Name Form	C=US O=CableLabs CN=CableLabs Manufacturer Root CA
Intended Usage	This certificate is used to issue Manufacturer CA Certificates.
Signed By	Self-Signed
Validity Period	30+ years. It is intended that the validity period is long enough that this certificate is never re-issued.
Modulus Length	2048
Extensions	keyUsage[c,m](keyCertSign, cRLSign) subjectKeyIdentifier[n,m] basicConstraints[c,m](cA=true)

R-303	The Multi-Stream Uni-Directional Receiving Device SHALL have a Manufacturer CA Certificate as defined in Table A-2

Table A-2: Manufacturer CA Certificate

Certificate Field	Certificate Field Description
Subject Name Form	C=<country> O=<CompanyName> [S=<state/province>] [L=<city>] OU=JTS [OU=<Manufacturer's Facility>] CN=<CompanyName> Mfg CA
Intended Usage	This certificate is issued to each Manufacturer by the CableLabs Manufacturer Root CA and can be provided to each device either at manufacture time, or during a field code update. This certificate appears as a read-only parameter in the device. This certificate issues Device Certificates. This certificate, along with the CableLabs Manufacturer Root CA Certificate and the Device Certificate, is used to authenticate the device identity
Signed by	CableLabs Manufacturer Root CA
Validity Period	Up to 30 Years
Modulus Length	2048
Extensions	keyUsage[c,m](keyCertSign, cRLSign) subjectKeyIdentifier[n,m] authorityKeyIdentifier[n,m](keyIdentifier=<subjectKeyIdentifier value from CA certificate>) basicConstraints[c,m](cA=true, pathLenConstraint=0)

R-304	***The Multi-Stream Uni-Directional Receiving Device SHALL validate the keyUsage extension with the keyCertSign and cRLSign bits asserted, and have the critical and mandatory flags set in the Card Manufacturer CA Certificate as received from the Card.***
R-305	***The Multi-Stream Uni-Directional Receiving Device SHALL validate the subjectKeyIdentifier extension composed of a keyIdentifier value which SHALL be the 160-bit SHA-1 hash of the value of the BIT STRING subjectPublicKey (excluding the tag, length, and number of unused bits from the ASN1 encoding) and have the non-critical and mandatory flags set in the Card Manufacturer CA Certificate as received from the Card.***
R-306	***The Multi-Stream Uni-Directional Receiving Device SHALL validate the authorityKeyIdentifier extension in the Card Device certificate which SHALL include a keyIdentifier value that is identical to the subjectKeyIdentifier in the Card Manufacturer CA certificate and have the non-critical and mandatory flags set in the CA Card Device Certificate as received from the Card, and The Multi-Stream Uni-Directional Receiving Device SHALL validate that the non-critical and mandatory flags are set in the authorityKeyIdentifier extension of the Card Manufacturer CA Certificate as received from the Card***
R-307	***The Multi-Stream Uni-Directional Receiving Device SHALL validate the basicConstraints extension using the parameters cA true and pathLenConstraint = 0 and have the critical and mandatory flags set in the Card Manufacturer CA Certificate as received from the Card.***
R-308	***The Multi-Stream Uni-Directional Receiving Device, SHALL have a Host Device Certificate as defined in Table A-3***

Table A-3: Device Certificate

Certificate Field	Certificate Field Description
Subject Name Form	C=<country> O=<Company Name> [ST=<state/province>] [L=<city>] OU=JTS [OU=<Product Name>] [OU=<Manufacturer's Facility>] CN=<POD ID or Host ID>
Intended Usage	This certificate is issued by the Manufacturer CA and installed in the factory. The NMS server cannot update this certificate. This certificate appears as a read-only parameter in the Device. This certificate is used to authenticate the device identity.
Signed By	Manufacturer CA

Validity Period	30 years
Modulus Length	1024
Extensions	keyUsage[c,m](digitalSignature, keyEncipherment), authorityKeyIdentifier [n, m](keyIdentifier=<subjectKeyIdentifier value from CA certificate>)

R-309	***The Multi-Stream Uni-Directional Receiving Device SHALL validate that the keyUsage extension in the Card Device Certificate extension is present and that the extension's digitalSignature and keyEncipherment parameter's are set to 1.***
R-310	***The Multi-Stream Uni-Directional Receiving Device SHALL validate that the authorityKeyIdentifier extension in the Card Device Certificate is present and the extension's keyIdentifier value is identical to the Device CA Certificate's subjectKeyIdentifier.***
R-311	***The Multi-Stream Uni-Directional Receiving Device Host_ID MUST be expressed as hexadecimal digits. The Alpha HEXcharacters (A-F) MUST be expressed as uppercase letters.***
R-312	***The Multi-Stream Uni-Directional Receiving Device Host_ID defined in the CN field of the X.509 Host Device certificate SHALL comply with the following requirements:*** ***· CableLabs SHALL assign a 3 decimal digit Host manufacturer number upon request by any DFAST signatory who has successfully completed Host certification,*** ***· The 10 most significant bits of the Host ID SHALL be set equal to the binary equivalent of the Host manufacturer number.*** ***· Host manufacturers shall set the remaining 30-bits of the Host_ID to a value between zero and 999,999,999 decimal, 3B9AC9FF hexadecimal, to facilitate on-screen presentation to subscribers and manual report back.*** ***· The Host_ID (40-bits) assigned to each Host device certificate MUST be unique to each Host device.***
R-313	***The Multi-Stream Uni-Directional Receiving Device validation SHALL comply with the certificate validation requirements in RFC 3280 [14], where they are referred to as "Certificate Path Validation", except the Uni-Directional Receiving Device SHALL NOT implement Note that because the certificate revocation check described in section 6.1.3 (a) (3) of RFC 3280 [14]. The revocation check cannot be performed, so it is omitted during the certificate path validation process. The certificate revocation check will be performed as part of the Authentication Phase 2 described in the SCTE 41 2004.***
R-315	***The Multi-Stream Uni-Directional Receiving Device SHALL validate that the period of the Card's device certificate SHALL begin with the Card's date of manufacture and extend to not greater than 30 years after the Card's date of manufacture.***

R-317	***The Multi-Stream Unidirectional Digital Cable Products shall be designed and manufactured in a manner to effectively frustrate attempts to discover or reveal (i) the unique number, of a specified bit length, assigned to each Unidirectional Digital Cable Product, the numbers used in the process for encryption or decryption of Controlled Content, or the private key used in the process for encryption or decryption of Controlled Content (collectively, "*** *Keys* ***") and (ii) the methods and cryptographic algorithms used to generate such Keys. For the avoidance of doubt, Keys includes the private key used for authentication. All authentication private keys shall be protected using encryption or obfuscation methods when being transferred across internal buses and stored in memory.***
R-318	***When Multi-Stream Uni-Directional Receiving Device is operating without a CableCARD module in place, the Multi-Stream Uni-Directional Receiving Device SHALL process inband EAS messages as described in Sections 4 and 5 of NIQ.***
R-319	***When monitoring PID 0x1FFB in-band or PID 0x1FFC out-of-band the Multi-Stream Uni-Directional Receiving Device SHALL recognize an MPEG table section with table ID 0xD8, as a cable_emergency_alert() message.***
R-320	***The Multi-Stream Uni-Directional Receiving Device SHALL silently discard* any cable_emergency_alert() message in which the value of the protocol_version field is non-zero.* 'Silently Discard' means 'display nothing, take no action and not be adversely affected by'.***
R-321	***When an out-of-band channel is available, the Multi-Stream Uni-Directional Receiving Device SHALL silently discard* any cable_emergency_alert() message received via the in-band (FAT) channel.* 'Silently Discard' means 'display nothing, take no action and not be adversely affected by'.***
R-322	***While not in "standby" power state, and when an out-of-band channel is available, the Multi-Stream Uni-Directional Receiving Device SHALL keep open and monitor an Extended Channel flow of type MPEG_section on PID 0x1FFC to watch for cable_emergency_alert() message events.***
R-323	***While not in "standby" power state, and when no out-of-band channel is available, the Multi-Stream Uni-Directional Receiving Device SHALL monitor PID 0x1FFB in-band to watch for cable_emergency_alert() message events.***
R-324	***For purposes of duplicate detection, the Multi-Stream Uni-Directional Receiving Device SHALL record the most recently received sequence_number value in each cable_emergency_alert() messages received, even those that are ultimately discarded.***
R-325	***The Multi-Stream Uni-Directional Receiving Device SHALL process the sequence_number in cable_emergency_alert() message in order to detect and discard duplicate transmissions. A cable_emergency_alert() message SHALL be discarded if the sequence_number matches the most recently received cable_emergency_alert() message.***
R-326	***Just following initial application of main power to the unit and prior to completion of Cardinitialization (if a Card is present), the sequence_number shall be considered to be unknown. Therefore, in that state, the Multi-Stream Uni-Directional Receiving Device SHALL not discard a cable_emergency_alert() message based on its sequence_number.***
R-327	***When no out-of-band channel is available, upon tuning to a new RF carrier, the sequence_number shall be considered to be unknown. Therefore, in that state, the Multi-Stream Uni-Directional Receiving Device SHALL not discard a cable_emergency_alert() message based on its sequence_number.***

R-328	*Just following establishment of communication on the out-of-band channel (e.g., just after Card initialization and/or application of main power to the unit), the sequence_number shall be considered to be unknown. Therefore, in that state, the Multi-Stream Uni-Directional Receiving Device SHALL not discard a cable_emergency_alert() message based on its sequence_number.*
R-329	*Just following loss of communication on the out-of-band channel (e.g., just after Card removal), the sequence_number SHALL be considered to be unknown. Therefore, in that state, the Multi-Stream Uni-Directional Receiving Device SHALL not discard a cable_emergency_alert() message based on its sequence_number.*
R-330	*When no out-of-band channel is available, the Multi-Stream Uni-Directional Receiving Device SHALL discard any cable_emergency_alert() message in which the currently tuned channel matches any exception_major_channel_number and exception_minor_ channel_number pair found in the exception list in the message.*
R-331	*When an out-of-band channel is available, the Multi-Stream Uni-Directional Receiving Device SHALL discard any cable_emergency_alert() message in which the currently tuned source_ID in the currently-tuned channel matches any exception_OOB _source_ID listed in the message.*
R-332	*The Multi-Stream Uni-Directional Receiving Device SHALL discard any cable_emergency_alert() message with an alert_priority field value of 0.*
R-333	*When fully powered, the Multi-Stream Uni-Directional Receiving Device SHALL process and respond to a cable_emergency_alert() message that passes duplicate detection and exception processing tests if the alert_priority is any value in the range 1 to 3 and the currently acquired service has no CA_descriptor() present in it's TS_program_map_section() The Multi-Stream Uni-Directional Receiving Device SHALL respond by scrolling alert_text() over video. Audio SHALL NOT be affected.*
R-334	*When fully powered, the Multi-Stream Uni-Directional Receiving Device SHALL process and respond to a cable_emergency_alert() message that passes duplicate detection and exception processing tests if the alert_priority is any value in the range 4 to 7. The Multi-Stream Uni-Directional Receiving Device SHALL respond by scrolling alert_text() over video. Audio SHALL NOT be affected.*
R-334a	*The Multi-Stream Uni-Directional Receiving Device SHALL process and respond to a cable_emergency_alert() message that passes duplicate detection and exception processing tests if the alert_priority is any value in the range 8 to 11. The M-UDCP SHALL respond by scrolling alert_text() over video, or output of alert-related video.*
R-335	*When fully powered, the Multi-Stream Uni-Directional Receiving Device SHALL process and respond to a cable_emergency_alert() message that passes duplicate detection and exception processing tests if the alert_priority is any value in the range 12 to 15. Response to the alert SHALL involve tuning to (or staying tuned to) the Details channel.*
R-336	*When processing of a cable_emergency_alert() message involves tuning to the Details channel and the alert_message_time_remaining field is non-zero, the Multi-Stream Uni-Directional Receiving Device SHALL remain on the Details channel, for the number of seconds indicated in alert_message_time_remaining (unless processing a new alert extends the time before returning to the channel that was interrupted by the alert).*

R-337	*When processing of a cable_emergency_alert() message involves tuning to the Details channel and the alert_message_time_remaining field is zero, the Multi-Stream Uni-Directional Receiving Device SHALL remain on the Details channel until the viewer manually changes channels or until processing of a new cable_emergency_alert() message results in a return to the channel that was originally interrupted or in tuning to a new Details channel.*
R-338	*When display of alert_text() is required ("Scroll alert_text() over video" in Figure 1), the Multi-Stream Uni-Directional Receiving Device SHALL scroll the text slowly across the top of the video screen, from right to left, over video.*
R-339	*When display of alert_text() is required ("Scroll alert_text() over video" in Figure 1 of NIQ), if the entire text message display cannot be completed within the time given by alert_message_time_remaining, the Multi-Stream Uni-directional Receiving Device SHALL continue the text display until it is complete.*
R-340	*The Multi-Stream Uni-Directional Receiving Device SHALL process multi-lingual alert_text(), and shall choose at most one language for display when text is provided multi-lingually.*
R-341	*If, during the display of alert_text(), a new cable_emergency_alert() message is received, the Multi-Stream Uni-Directional Receiving Device SHALL process it for duplicate detection, exception processing, and alert priority. If the overlapping alert passes these tests, alert_text() display SHALL be stopped, the text SHALL be erased, and the new alert SHALL be processed.*
R-342	*If, when tuned to the Details channel as a result of processing a cable_emergency_alert() message, a new cable_emergency_alert() message is received, the Multi-Stream Uni-Directional Receiving Device SHALL process it for duplicate detection, exception processing, and alert priority. If the overlapping alert is discarded as a result of tests, the processing of the prior alert SHALL be unaffected.*
R-343	*If, when tuned to the Details channel as a result of processing a cable_emergency_alert() message, a new cable_emergency_alert() message is received, the Multi-Stream Uni-Directional Receiving Device SHALL process it for duplicate detection, exception processing, and alert priority. If the overlapping alert passes these tests, the new alert SHALL be processed.*
R-344	*The Multi-Stream Uni-Directional Receiving Device SHALL enable HDCP encryption at all times when video is transmitted over the DVI or HDMI link.*
R-345	*If HDCP authentication fails, then the Multi-Stream Uni-Directional Receiving Device SHALL not transmit video over the DVI or HDMI link, excluding any alerts generated by the Uni-Directional Receiving Device informing the user of the condition.* *Note: Continued transmission of a blank video field over the DVI or HDMI link for the purpose of muting video in this case is acceptable.*
R-346	*The Multi-Stream Uni-Directional Receiving Device SHALL NOT reject as invalid a CableCARD's Certificates solely on the basis of missing optional fields.*
R-347	*The Multi-Stream Uni-Directional Receiving Device MAY provide support for an uncompressed digital video interface (output) using either Digital Visual Interface [DVI] or High-Definition Multimedia Interface [HDMI].*
R-348	*The Multi-Stream Uni-Directional Receiving Device MAY provide support for an uncompressed digital video interface (input) using either Digital Visual Interface [DVI] or High-Definition Multimedia Interface [HDMI].*

R-349	*If the Multi-Stream Uni-Directional Receiving Device includes a DVI output, it SHALL use a female DVI-D connector, which at a minimum supports the Single Link Transmission Minimized Differential Signaling as defined in [DVI].*
R-350	*If the Multi-Stream Uni-Directional Receiving Device includes a DVI input, it SHALL use a female DVI-D connector, which at a minimum supports the Single Link Transmission Minimized Differential Signaling as defined in [DVI].*
R-351	*If the Multi-Stream Uni-Directional Receiving Device includes an HDMI output, it SHALL use a female HDMI connector, which at a minimum supports the Single Link Transmission Minimized Differential Signaling as defined in [HDMI].*
R-352	*If the Multi-Stream Uni-Directional Receiving Device includes an HDMI input it SHALL use a female HDMI connector, which at a minimum supports the Single Link Transmission Minimized Differential Signaling as defined in [HDMI].*
R-354	*The Multi-Stream Uni-Directional Receiving Device, when supporting multiple FAT tuners SHALL provide an implementation of the M-CARD interface operating in M-Mode as specified in HPIA.*
R-355	*The Multi-Stream Uni-Directional Receiving Device, when supporting multiple FAT tuners SHALL provide an implementation of the M-CARD interface operating in M-Mode as specified in HPIA.*
R-356	*The Multi-Stream Uni-Directional Receiving Device in M-Mode, when supporting multiple FAT tuners SHALL implement M-Mode Copy Protection as defined in HPIN.*
R-357	*The Multi-Stream Uni-Directional Receiving Device in M-Mode, when supporting multiple FAT tuners SHALL support the simultaneous reception of at least two independent FAT channels anywhere in the FAT channel RF frequency range and deliver the demodulated streams to the Card using the multi-stream mode defined in HPIA.*
R-358	*All FAT tuners SHALL meet the same performance requirements as specified in this Multi-Stream Uni-Directional Receiving Device PICS.*
R-359	*The Multi-Stream Uni-Directional Receiving Device in M-Mode, when supporting multiple FAT tuners SHALL support reception of all FAT channels and interface to all cable signals through a single RF input connector.*
R-360	*The Multi-Stream Uni-Directional Receiving Device Manufacturer CA Certificate SHALL be verified as part of a certificate chain containing the CableLabs Manufacturer Root CA Certificate and the Manufacturer CA Certificate.* *Note: Verify the CableLabs root certificate is the issuer in the manufacturer root certificate.* *Note: The Chaining of the Host certificate is generated by the Certificate Authority.*

R-362	*The System Information tables (e.g., NTT, NIT and VCT) required to build the video channel map used for program navigation SHALL be stored in non-volatile memory in the M-UDCP.*
R-363	*The M-UDCP DER-encoded tbsCertificate.issuer field of a certificate SHALL be an exact match to the DER-encoded tbsCertificate.subject field of its issuer Certificate.*
R-365	*The M-UDCPsSHALLset the remaining 30-bits of the Host_ID to a value between zero and 999,999,999 decimal, 11,1011,1001,1010,1100,1001,1111,1111 binary, 3B9AC9FF hexadecimal, to facilitate on-screen presentation to subscribers and manual report back.*
R-366	*If analog component video outputs are present on the M-UDCP the MPEG sequence display extension SHALL be observed when present in the transport stream to determine when color matrix conversion is necessary. For any standard definition MPEG format listed in Table 3 of [ANSI/SCTE 43] that does not include the sequence display extension, the colorimetry will be converted from SMPTE-170M to ITU-R-BT.709 in the M-UDCP. User selectable colorimetry conversion MAY be available to override default settings.*
R-367	*The M-UDCP MPEG-2 decoder SHALL support error concealment to minimize macroblock and stream synchronization errors.*
R-368	*The M-UDCP MPEG-2 decoder SHALL support decoding of a MPEG-2 Main Profile @ High Level Single Program Transport Stream encoded at a constant bit rate (CBR) of 38.81070Mbps or variable bit rate (VBR), with peak rates up to 38.81070Mbps, the maximum payload rate for a 256QAM channel.*
R-369	*The M-UDCP LO Leakage (Input EMC) SHALL be < -37 dBmV over 54 MHz to 864 MHz.*
R-370	*The M-UDCP MAY process the content_advisory_descriptor () (0x87), when present, as defined in ATSC A/65-B and EIA 766-A and transported in either the PMT of the in-band MPEG-2 transport stream or passed across the CableCARD Extended Data Channel according to [CCCP2.0].*
R-371	*For the purposes of passing the content advisory information through on line 21 of the NTSC analog video output, the M-UDCP SHALL process the content advisory information, when present, as specified in [EIA/CEA-608-B] and transported according to [ANSI/SCTE 21] or [ANSI/SCTE 20]*
R-372	*The M-UDCP SHALL reconstruct line 21, when present, as specified in CEA/EIA-608-B and transported according to [ANSI/SCTE 21] or [ANSI/SCTE 20] on any analog NTSC output.*
R-373	*The M-UDCP SHALL NOT be adversely affected by the receipt of a content advisory descriptor referencing a rating region unsupported by the M-UDCP.*
R-374	*The M-UDCP SHALL NOT be adversely affected by presence of absence of an RRT.*
R-375	*The M-UDCP SHALL be certified by Dolby Laboratories, Inc. for Dolby Digital™ decoding.*
R-376	*The M-UDCP SHOULD check the CRC to ensure invalid data is not processed.*

R-377	*For analog NTSC if the M-UDCP provides 480p or greater analog component video outputs or uncompressed digital output streams, decoding and rendering of the 608 line 21 caption data when present SHALL be provided according to [47CFR15.122].*
R-378	*The M-UDCP SHALL be capable of extracting [ANSI/SCTE 21] or [ANSI/SCTE 20] caption data in the presence of private user_data.* *Note: This private user data may appear in various order as compared to the standard user data (such as first, second, third).*
R-379	*The M-UDCP SHALL provide a way to display either by picture in picture , or by special key-stroke sequence the ability to toggle between tuners, and to be able to identify/ differentiate specific tuner functions independently of the other tuners.*
R-380	*The M-UDCP SHALL have a non-removable label that says "M-Card Only" in close proximity to a Card slot that supports M-mode only.*

Appendix B – Best Practice (Informative)

B.1 Closed Captioning Use Cases

	Caption Type				Output Actions (If output is supported & active)			
Signal	**NTSC (608) over VBI**	**NTSC (608) over SCTE 20**	**NTSC (608) over SCTE 21**	**DTVCC (708) over SCTE 21**	**CVBBS (Composite), S-Video, (RF out), 480i ACV (Component)**	**480p or > ACV (Component), HDMI**	**1394**	**Display (Terminal only)**
Analog	X	N/A			Pass-through line 21, Optionally decode & overlay	Decode 608 & Overlay	Optionally encode to SCTE 21 and Pass-through stream	Decode 608 & Display
Digital	N/A	X			Extract 608 & Reinsert into line 21, Optionally decode & overlay	Decode 608 & Overlay	Pass-through stream	Decode 608 & Display
			X		Extract 608 & Reinsert into line 21, Optionally decode & overlay	Decode 608 & Overlay	Pass-through stream	Decode 608 & Display
		X	X		Extract 608 from SCTE 20 or SCTE 21 & Reinsert into line 21, Optionally decode 608 & overlay	Decode 608 from SCTE 20 or SCTE 21 & Overlay	Pass-through stream	Decode 608 from SCTE 20 or SCTE 21 & Display
				X	Optionally decode 708 & overlay	Decode 708 & Overlay	Pass-through stream	Decode 708 & Display
			X	X	Extract 608 & Reinsert into line 21, Optionally decode 708 & overlay	Decode 708 & Overlay	Pass-through stream	Decode 708 & Display